WIRE AND WIRE PRODUCTS

MARCH 1960

Packaged Productivity in Wire!

VAUGHN® MOTOBLOX®

VAUGHN puts everything but a bow on this package for you . . . including all electrical equipment and prewired controls. Compact, self-contained, easy to install, this packaged MOTOBLOX requires no separate room or additional space for motor generator set, starter or dc control—affords the highest speeds you can use today. Write us for the details!

The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

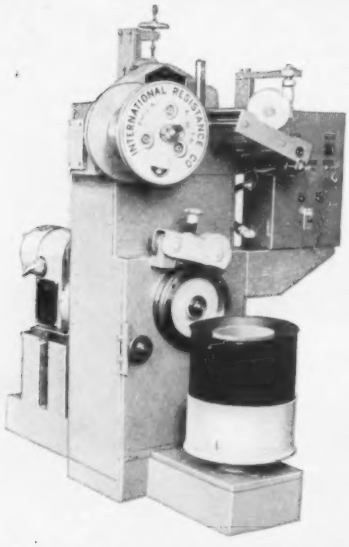
COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

COULTER & McKENZIE

CONSTANT TENSION DRAW-PAK EQUIPMENT

FOR CONTINUOUS WIRE PACKING & DRAWING

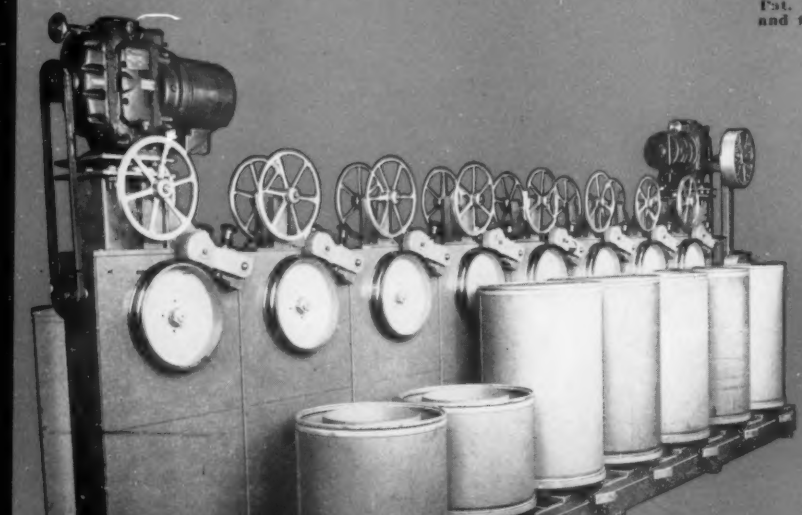


- Combination drum or spool take-up and rewinder.
- Shown for single wire.
- Adjustable for tension, pitch and amplitude of traverse.
- 12" spool shown. 30 to 150 lb. drums.

MODEL C-100 TAKE-UP

- Shown with single drive mounting to 16 wires .008" to .051"
- Enameling, annealing, galvanizing, tinning, etc.
- Containers 30 to 150 lbs.

Pat. No. 2,732,080. Other U.S. and foreign patents pending.



MODEL C-500 TAKE-UP

- Shown with tandem drive mounting 8 wires each side .020" to .250".
- Galvanizing, patenting, enameling, etc.
- Drum or adapter weights 200 to 1,000 lbs.

MODEL 138-A DRAW BLOCK

- Single draft wires .016" to .375"
- "Draw-cast" die box shown gives adjustable positive cast control. Also available in other sizes.
- Process adapters to order — drums to 1,000 lbs.

Your inquiry specifying the application which is of interest to you will result in prompt and courteous attention.

Barron & Crowther Ltd., Eastleigh, Hants, England. European Draw-Pak Licensee. Idos Industries Ltd., Royston, Herts, England, Sales Agents.

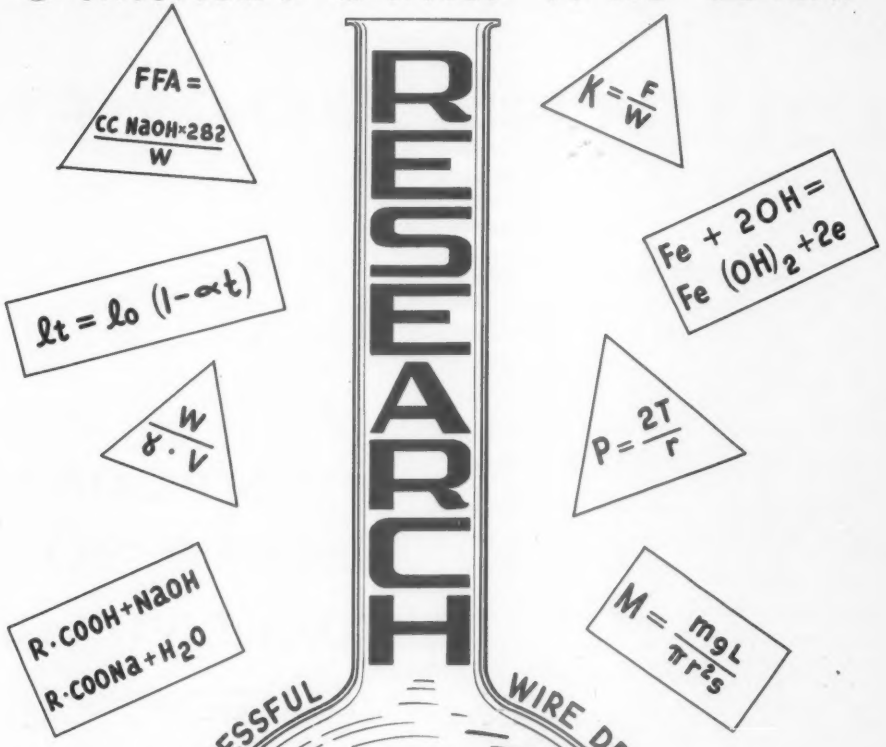
35 UNION AVENUE

TELEPHONE EDISON 5-1101
LIEBER'S CODE "MACKENZIE"

THE COULTER & McKENZIE MACHINE CO., INC.

SINCE 1843 BRIDGEPORT 7 CONNECTICUT, U.S.A. INCORPORATED 1881

"America's Finest Wire Draw"



WEEKS OF OUTSIDE PROTECTION for BARE GALVANIZED or PLATED STEEL

EXCELLENT for NON-FERROUS PROTECTION

COMPLETELY SAFE and ECONOMICAL

"Look to Standard for the Future"

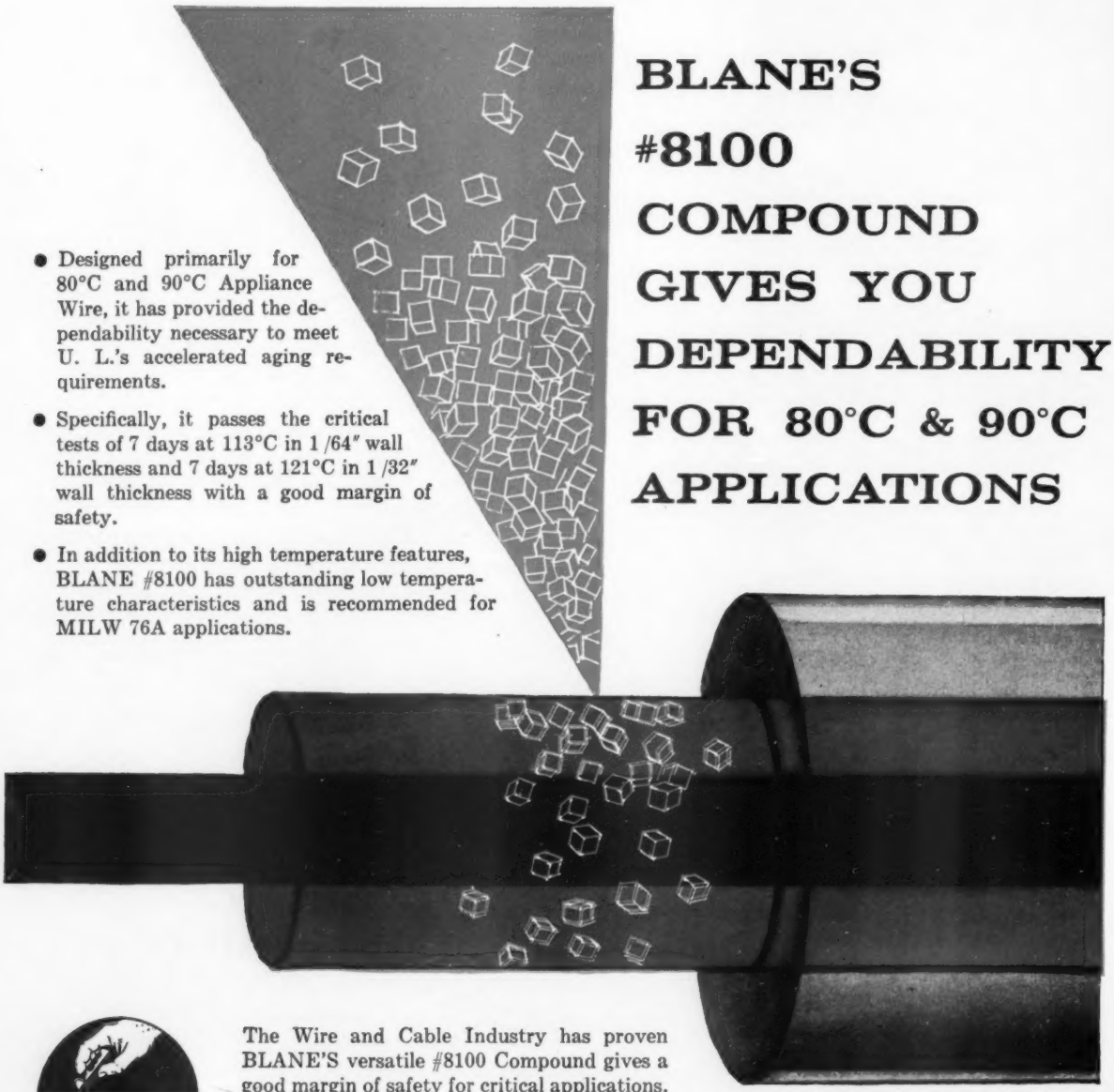
Cordially yours,

Standard Industrial COMPOUNDS CO., INC.
Member WAS

FRANKFORT, ILLINOIS
(A suburban Chicago area city)
Telephones: 2131 - 2141

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

INDUSTRY PROVEN!



BLANE'S #8100 COMPOUND GIVES YOU DEPENDABILITY FOR 80°C & 90°C APPLICATIONS

- Designed primarily for 80°C and 90°C Appliance Wire, it has provided the dependability necessary to meet U. L.'s accelerated aging requirements.
- Specifically, it passes the critical tests of 7 days at 113°C in 1 /64″ wall thickness and 7 days at 121°C in 1 /32″ wall thickness with a good margin of safety.
- In addition to its high temperature features, BLANE #8100 has outstanding low temperature characteristics and is recommended for MILW 76A applications.

BLANE

The Wire and Cable Industry has proven BLANE'S versatile #8100 Compound gives a good margin of safety for critical applications. It is the only compound in its price range that has consistently met UL requirements of 7 days aging at elevated temperatures. Why not find out why more and more Wire and Cable manufacturers are using BLANE #8100. Samples and technical data on request.

THE BLANE CORPORATION

CANTON, MASSACHUSETTS

this is a Nail!

It's a special kind of nail, knurled for greater holding ability and produced by machines which not only make nails, but at the same time drive and countersink them in leather or wood at rates up to three per second.

The wire used by these nailing machines must meet critical specifications. It must be ductile enough to form a perfect head and clinch when needed, yet be hard enough to penetrate tough grains and knots. Moreover, it must be consistent in quality throughout its length.

For 26 years, PAGE has supplied wire which meets exactly the requirements of the manufacturer of these machines—The Auto-Soler Company, Atlanta, Georgia.

Regardless of *your* use of wire, you can count on PAGE uniformity. Whether you make hairpins or lock washers, PAGE wire will give you the tensile strength, ductility, finish, tolerance and other properties you require.

PAGE facilities are designed to produce a wide range of high quality manufacturers wire items—including special shapes. Where requirements are exacting, you will find PAGE wire unexcelled.

Since 1902, we have pioneered many "firsts" in the wire industry. The latest of these is corrosion-resistant ACCO *Aluminized* Wire—commercially pure aluminum bonded to a steel core.

LET'S TALK WIRE! Get in touch with us for your wire needs. Gain the benefit of PAGE experience and "wire know-how" to improve your product and lower your costs.

ACCO

PAGE MANUFACTURERS WIRE

Page Steel and Wire Division • American Chain & Cable Company, Inc.

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

PAGE *-the source for answers to wire problems*

MORGAN
WIRE DRAWING MACHINES

GIVE YOU High Quality Results

Heavy Weight Bundles

Low Die Cost

Low Power Cost

. . . in Minimum Floor Space

MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS, U. S. A.

ROLLING MILLS • MORGOIL BEARINGS • WIRE DRAWING MACHINES • COMBUSTION CONTROLS

WM-120

WIRE AND WIRE PRODUCTS*

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 35 March, 1960 No. 3

Designated as Official Publication By The Wire Association

Contents

The Wire Outlook 319

An Analysis of Extrusion Screws
by William J. Owens, Jr. 321

A Pre-Production Test for Acid Inhibitors
by Rudolf H. Hertzog 327

Wire Rope Practices at The Scripps Institution of Oceanography
by Maxwell Silverman and Jeffery D. Frautschy 329

Nylon 6 As A Wire Jacketing Material
by C. W. Taylor 335

Continuous Cycle, Heating-Cooling Furnace Provides Better Structure Control in Annealing for Machining
by A. G. Sturrock 340

Color Standards for Plastic Insulated Communication Cables and Wires
by C. R. Ballard and W. W. Newman, Jr. 343

New Galvanizing Department at Gilbert & Bennett's Blue Island, Illinois, Plant 348

Stiffness Factor: A Quality Control Measurement for Wire
by N. W. Roberts 350

Wire Kinks ..... 353 and 355

The Wire Association — Electric Wire & Cable Section Spring Regional Meeting 357

Outstanding Personalities of the Wire Industry 366

A Review of Recent Wire Patents 373

The Wire Association West Coast Regional Meeting 378

Aluminum Statistics 379

Index to Advertisers 397

Where-to-Buy 398-402

WIRE and WIRE PRODUCTS is indexed regularly by
Engineering Index, Inc., New York, N. Y.
The H. W. Wilson Co., New York, N. Y.

RICHARD E. BROWN, President and Publisher
R. S. Spengel, Secy.-Treas. & Gen'l. Manager
J. Edward Donnellan, Vice-President
Edmund D. Sickels, Editor

Publication Office: Guilford, Conn.
Executive Office: 453 Main St., Stamford, Conn.
* Reg. U. S. Pat. Off.

WIRE & WIRE PRODUCTS, Vol. 35, No. 3 March, 1960. Publication Office at Guilford, Conn. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. and Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Second class postage paid at Guilford, Conn. under the act of March 3, 1879, Copyright, 1960 Quinn-Brown Publishing Corp.

Shore Line Times Publishing Company, Guilford, Connecticut

CUT!

What kind of cut do you get with your present cutting tool?

A clean cut?

An easy cut?

Do these qualities last after the tool has been in use a few months?

CAREW Cutters may not be the solution to every cutting problem, but they are to many.

CAREW Cutters and replacement jaws are stocked by most mill supply dealers. Try some, and feel free to write us on your Cutting Problems.

M. W. ROBINSON CO., INC.

ROCKFALL, CONN., U.S.A.

96 YEARS OF CUTTING WIRE AND COSTS

Improved

SHAFTLESS TAKE-UP

General Specifications

Both side frames move in or out simultaneously, keeping center of reel traverse always in line with delivery point of cable, thus equalizing and minimizing cable deflection.

Reel gear and drive pinion remain in engagement at all times.

Quick traverse reversing by air valve.

Motor driven screw width adjustment.

Motor driven screw reel lift.

Traverse adjustable for reel width and cable diameter, while machine is running.

Traverse speed adjustable over range of cable diameters in increments of 1/20.

Drive can be supplied to suit customer's requirements.

Mechanical slip clutch friction drive for the capstan.

Variable speed motor drive with manual control.

Variable speed motor drive with automatic electrical control.

Available in the following sizes:

36" dia. reel to 52" dia. max.
36" dia. reel to 72" dia. max.
36" dia. reel to 84" dia. max.
42" dia. reel to 96" dia. max.

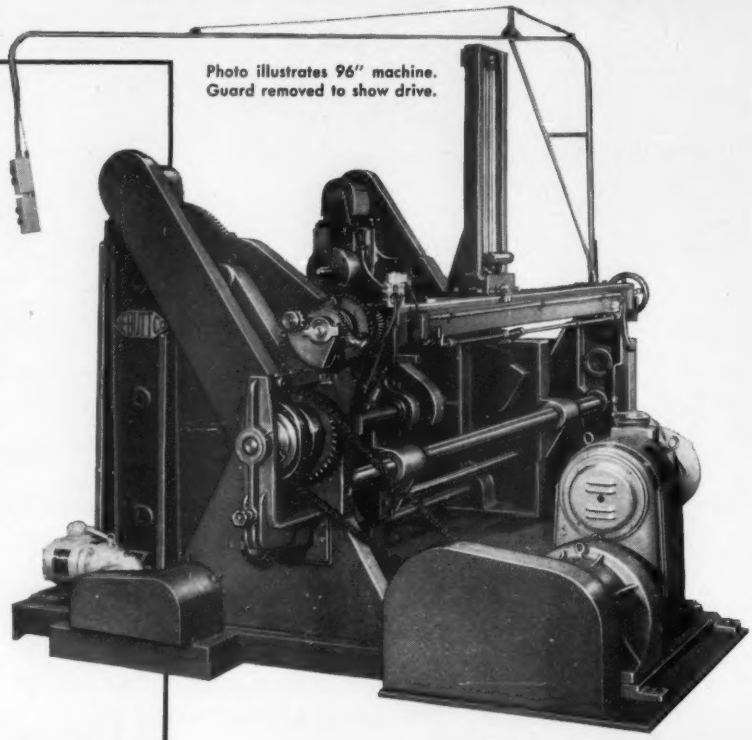
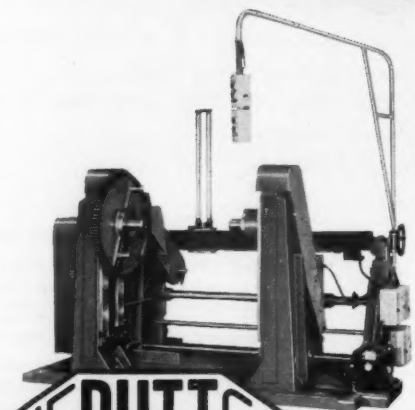


Photo illustrates 96" machine. Guard removed to show drive.

This heavy duty Take-Up includes latest developments which further increase ability to produce high quality cables. Many of these machines, in the previous model, are in continuous, trouble-free operation in plants throughout the country. It handles bare or insulated cables of all weights and sizes at a wide range of speeds . . . is readily controlled by the operator by means of the convenient swinging pendant push button station. Various drives can be provided and the machine readily adapted by our engineers to meet your special requirements. Write us for further information and details.



NEW ENGLAND BUTT CO.

DIVISION WANSKUCK COMPANY

304 Pearl Street · Providence 7, R. I.

In England — James Day (Machinery) Ltd., 28 Maddox Street, London, W-1.

NEBUTTCO

Braiders **Bunchers**
Cablers **Stranders**
Take-ups **Taping Machines**

DO YOU NEED

HIGH ACCURACY IN DIAMETER MEASUREMENT AND CONTROL ON

- WIRE
- CABLE
- COATED FILAMENT

THE *SERC DIAMACONTROL* DOES IT — AND — DOES IT CONTINUOUSLY!

WHEREVER MICROMEASUREMENTS OF DIAMETERS AND WIDTHS ARE ESSENTIAL, THE *SERC DIAMACONTROL* WILL DO THE JOB FOR YOU ACCURATELY AND UNFAILINGLY. MEASURES ANY MATERIAL FROM THOSE OF SPIDER WEB FINENESS TO PRECISION-MADE SUBMARINE CABLES.

IF YOUR MANUFACTURING OPERATIONS CALL FOR PRECISION CONTROLS TO ACHIEVE EXACTING SPECIFICATIONS, THE *SERC DIAMACONTROL* WILL HELP YOU MEET THEM.

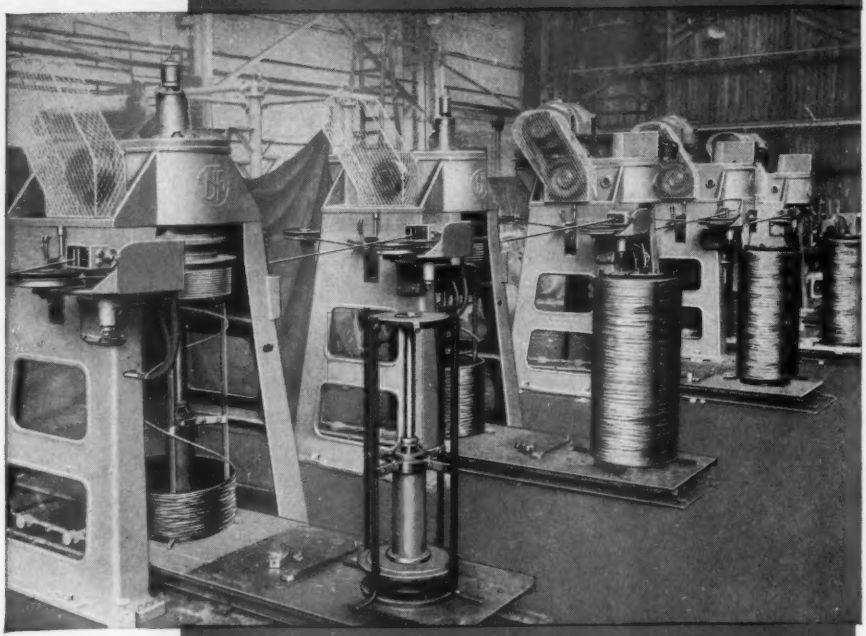
FULL DETAILS UPON REQUEST — AND A DEMOSTRATION, IF YOU WANT TO SEE IT IN OPERATION.

SEND TODAY FOR DESCRIPTIVE LITERATURE

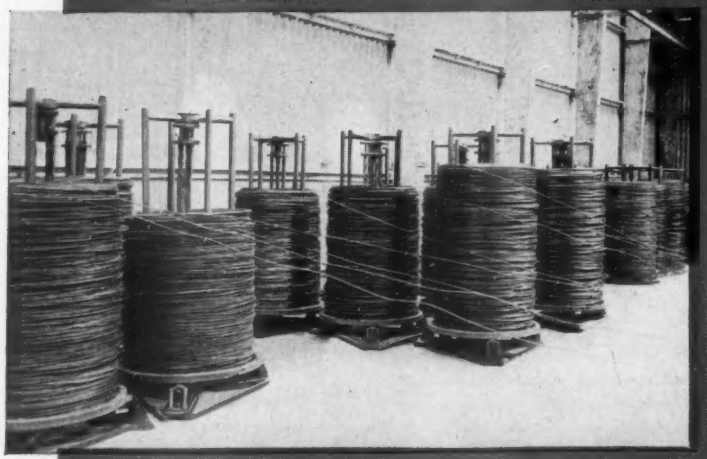
NSE NATIONAL STANDARD ELECTRONICS INC.

2 EAST END AVE • NEW YORK 21, N.Y.
Telephone - RHinelander 4-4100

Farmer Norton Gravity blocks for handling large coil weights. These can be built for coils up to 2,000 lb or larger. The units can either draw or wind as required. Can be fitted with constant or variable speed motors. DO NOT TWIST THE WIRE. This is essential for Carbon Steel wire. Are built in block sizes from 36" to 12" diameter.



Five Double Draft Gravity blocks drawing 15 cwt coils of mild steel wire 5.4 mm to 3.7 mm or Single Draft 5.4 mm to 4.4 mm. Drawing speeds 600 ft./min and 800 ft./min. All five of these blocks are operated by one man.

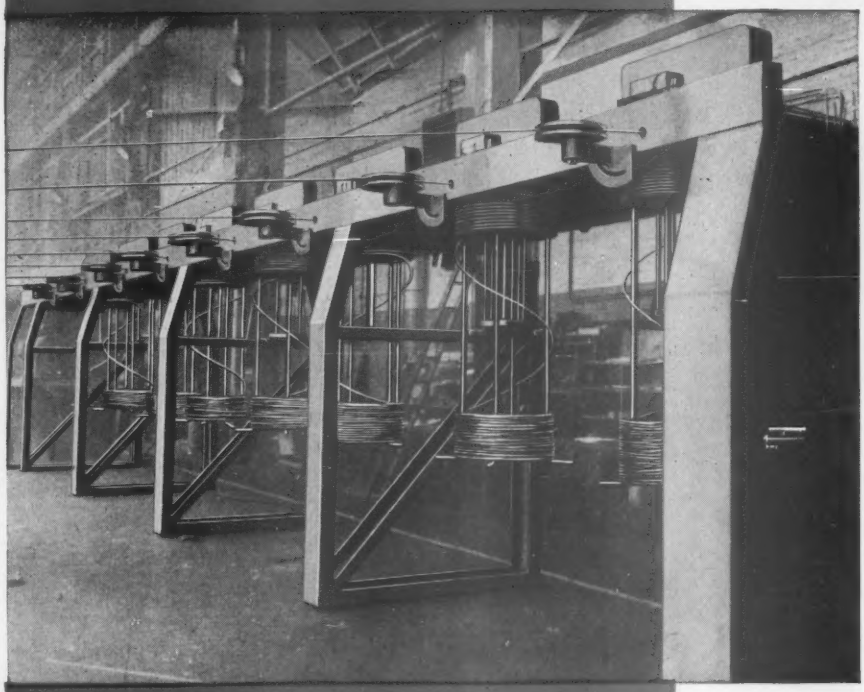


Large coils of this type drawn on Gravity blocks are ideal for feeding cutting machines, nail machines, patenting and galvanising furnaces etc.

SIR JAMES FARMER NORTON & CO. LTD.,

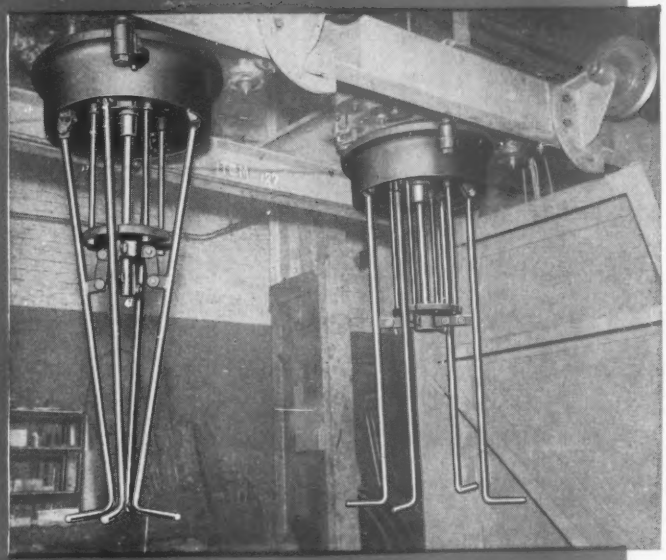
ADELPHI IRONWORKS, ADELPHI STREET, SALFORD, 3 ENGLAND. Telephone BLAckfriars 3613/4/5

Agent: Steel & Wire Machinery Inc., 15457 Euclid Avenue, Cleveland 12, Ohio, U.S.A.



Eight head machine for collecting Galvanised wire 5mm - 1.6 mm. in 1,000 lb coils. Drive through variable speed oil gear to give winding speeds of 0 - 150 ft/min. For larger coils up to 2,000 lb a different design of wire collectors is used.

OVER 200 GRAVITY BLOCKS SUPPLIED TO OUR CUSTOMERS THROUGHOUT THE WORLD:—



In United Kingdom
Australia
India
Pakistan
France
Belgium

Orders are being executed for U.S.A.

Take up frames for Galvanising, tinning and heat treatment.

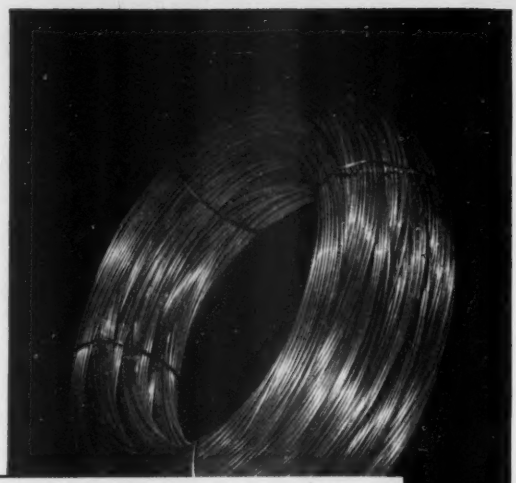
The strippers are collapsed pneumatically.

. . . who are the Inventors and Pioneers of this inverted system of drawing.

"Tough-to-make"
Cold-Headed Products like these . . .

- Tubular Rivets (Punch Extruded).
- Non-threaded, multi-diameter, head and shoulder parts, drilled or not drilled.
- Washer and binding head screws with rolled threads.
- Special design fastenings and other small parts of intricate shape, with or without requirements for drilling or threading.

. . . become "routine" with



SCOVILL

EXTRUDED

Cold-heading WIRE

(Cartridge Brass, 70%)

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

IT ELIMINATES

1. **OUT-OF-ROUND HEADS**
2. **INCOMPLETE FILLING-OUT OF HEADS AND SHOULDERS**
3. **ROUGH "ORANGE PEEL" EFFECT**
4. **UNSOUND HEADED PARTS**
5. **RED STREAKS AND STAINS**
6. **NON-UNIFORM FLOW**

SCOVILL®

Send for new folder

Scovill Cold-Heading Wire is extruded from CONTINUOUS-CAST brass billets by the hot extrusion process, then cold-drawn and annealed in accordance with closely controlled mill procedures.

CONTINUOUS CASTING produces *more uniform metal* than any other process, both in chemical composition and in freedom from casting flaws or other variations.

Scovill has standardized on *Cartridge Brass,* 70% for wire to be used in cold-heading operations. This alloy has a 5% HIGHER COPPER CONTENT than is generally found in brass cold-heading wire and is more ductile.

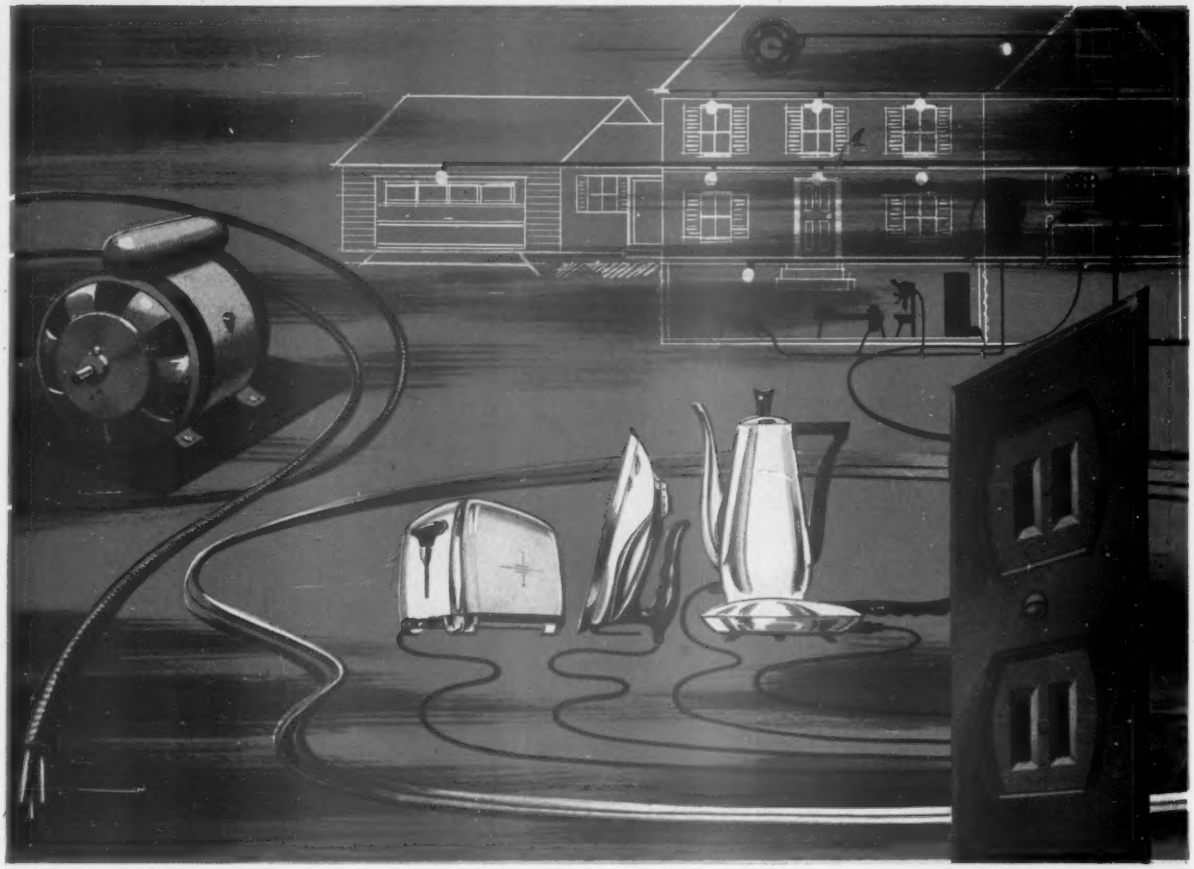
Prove this on your next wire order. Let us help you specify the proper closely controlled Scovill temper to produce more nearly perfect headed brass parts . . . whether you require "flow" characteristics for heading, or "flow" plus essential rigidity for secondary machining.

SCOVILL MANUFACTURING COMPANY, Mill Products Division
99 Mill Street, Waterbury 20, Connecticut. Phone PLaza 4-1171.

125C38

Naugatuck MARVINOL

POLYVINYL CHLORIDE RESINS



four resins for electrical application

NAUGATUCK now offers the Wire and Cable Industry *more* PVC resins for insulation extrusion than does any other resin manufacturer.

Two of these Marvinol® resins, VR-22 and VR-23, have UL approval. These resins are, respectively, of high and intermediate molecular weight. Both have good dry blending properties.

Marvinol VR-24 and Marvinol VR-25 are resins of progressively lower molecular weights. They provide high volume resistivity in semi-rigid compounds with little or no plasticizer. Both deserve your careful evaluation for future electrical products.

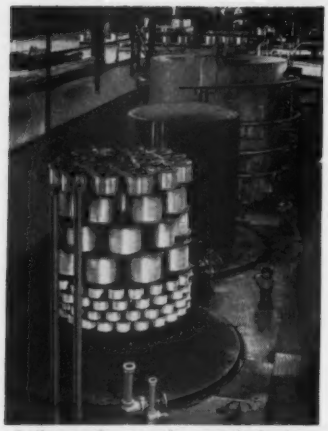
Check with your Marvinol technical representative for complete data and evaluation samples, or write us on your firm's letterhead.

United States Rubber

Naugatuck Chemical Division 329M Elm Street Naugatuck, Connecticut

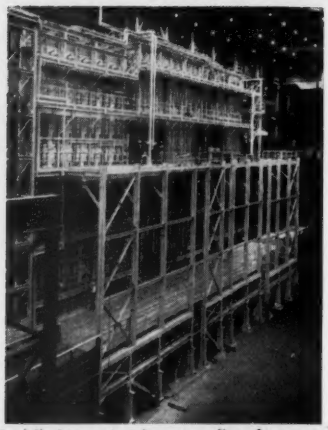
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices

DIST. OFFICES: Akron • Boston • Gastonia • Chicago • Los Angeles • Memphis • New York • Phila. • CANADA: Naugatuck Chemicals, Elmira, Ont. • CABLE: Rubexport, N.Y.

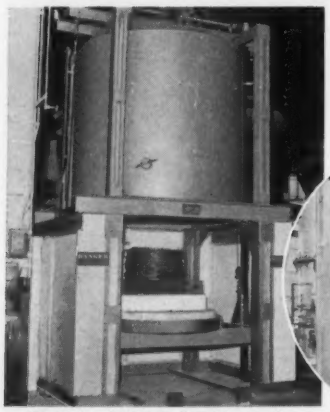


Bell type furnace for spooled wire.

Sunbeam WIRE and STRIP FURNACES

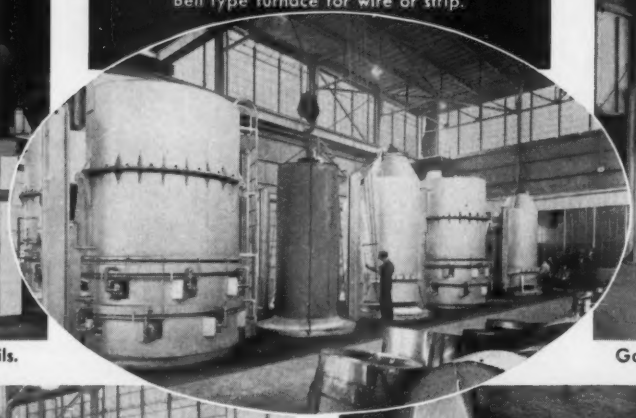


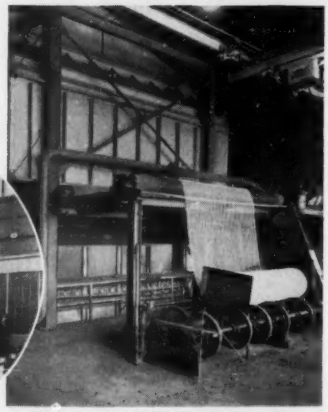
World's largest strip annealing furnace.



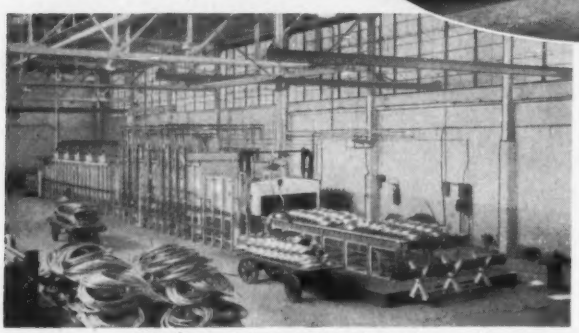
Elevator furnace for wire coils.

Bell type furnace for wire or strip.

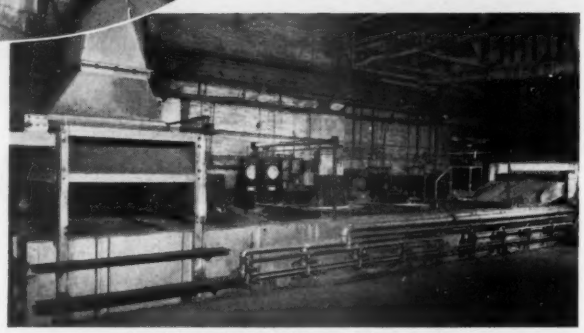




Galvanizing furnace for fencing.



Roller hearth furnace for wire coils.



Lead bath furnace for wire in strands.

Complete service available . . . design through installation

Sunbeam equipment for the metals industry includes complete wire and strip furnace installations . . . batch or continuous—for ferrous and non-ferrous metals. We build the largest, the smallest and everything in between. All auxiliary equipment for heat treatment including cleaning, cooling, fluxing, coating, atmosphere generation, process and control panel, and handling equipment can be furnished as a single contract. In this manner you obtain the many added advantages of dealing with a single supplier—in purchasing, planning, delivery, installation and service. Whether planning an expansion, opening a new plant or replacing equipment, it will pay you to see Sunbeam first. Let us know your requirements.

Sunbeam

THE BEST INDUSTRIAL FURNACES MADE

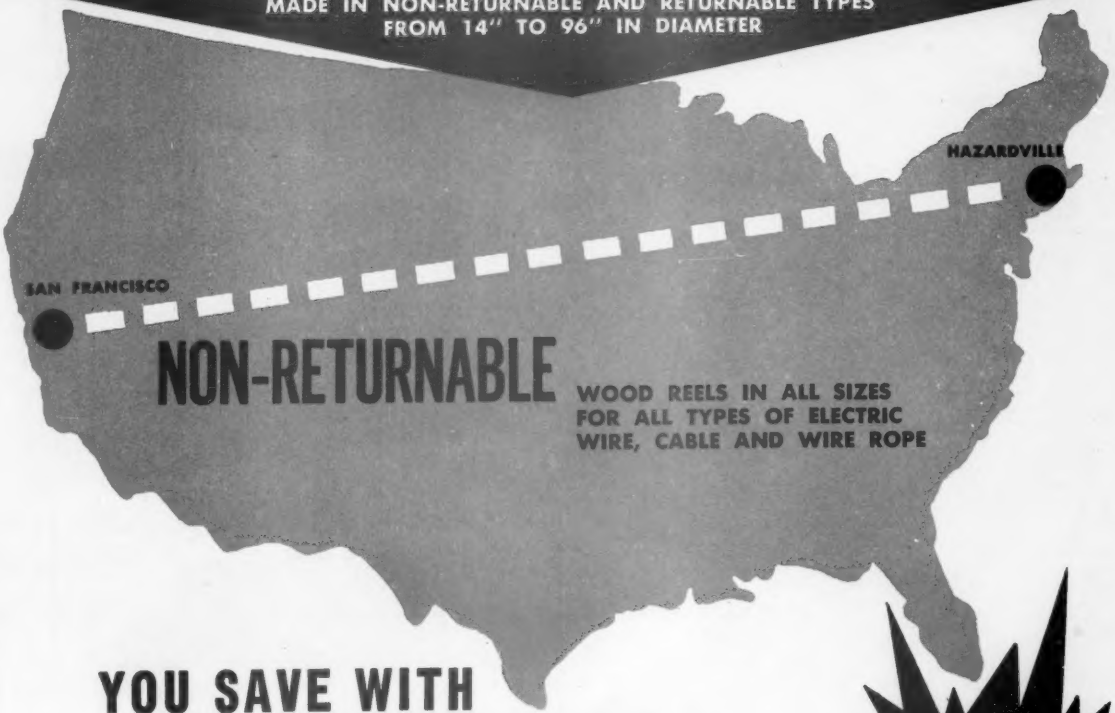
Sunbeam EQUIPMENT CORPORATION

Dept. 252 198 Mercer Street Meadville, Penna.

A BOARDWALK FROM HAZARDVILLE TO SAN FRANCISCO

The wood used in the manufacture of BRIDGE REELS, in one average year's production, would make a boardwalk one-inch thick and twelve inches wide stretching over 3,000 miles across the country — OR — it would provide enough lumber to build 3,000 six-room houses — THAT'S QUITE AN OPERATION! The important deduction, however, is that BRIDGE REELS for WIRE, WIRE ROPE and CABLE are good enough to meet the exacting demands of most of the big wire plants of the country.

MADE IN NON-RETURNABLE AND RETURNABLE TYPES
FROM 14" TO 96" IN DIAMETER

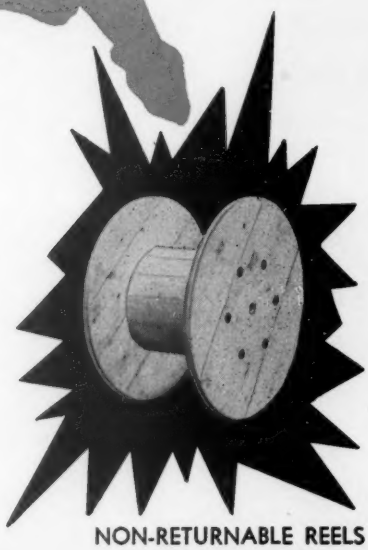


NON-RETURNABLE

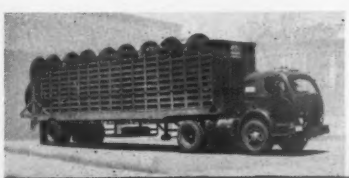
WOOD REELS IN ALL SIZES
FOR ALL TYPES OF ELECTRIC
WIRE, CABLE AND WIRE ROPE

YOU SAVE WITH NON-RETURNABLES

- Reduced Reel Investment
- Less Storage Space
- Lower Freight Costs
- No Repair Costs
- No Return Freight Charges
- No Bookkeeping
- No Deposits Needed
- No More Headaches!!



NON-RETURNABLE REELS
GIVE YOU A DEFINITE
PACKAGING COST.



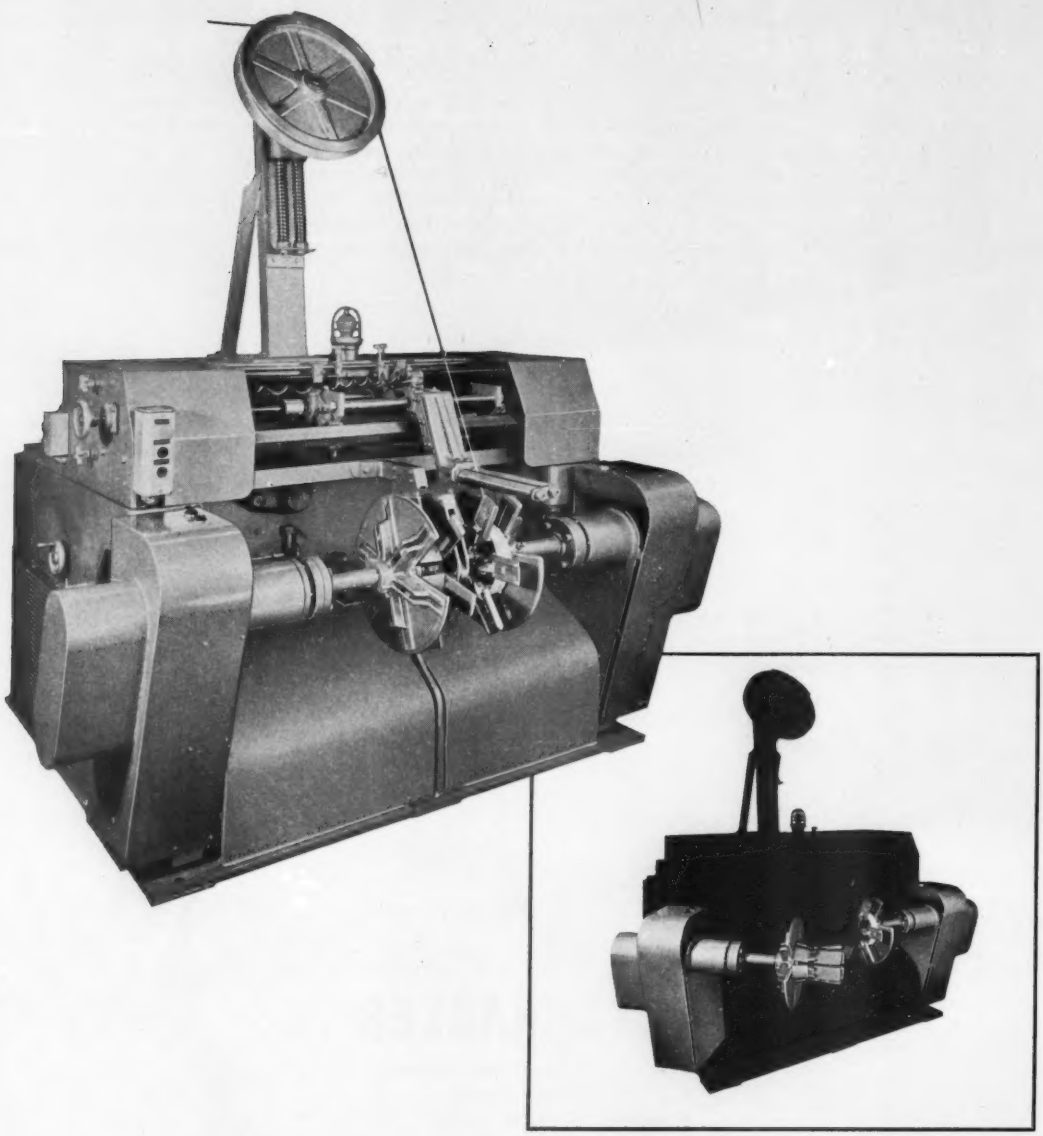
HIGH SPEED
SHIPPING SERVICE IN
OUR OWN TRUCKS

within a radius of 250 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.

"REEL GOOD . . .

Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"



ENTWISTLE

Manufacturing Corporation

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

Over 40 years of dependable service

Formerly James L. Entwistle Co.

Europe, South America, Mexico
FOREL EQUIPMENT CORPORATION
165 Broadway, New York 6, N. Y.

British Associates
THE KEMSON ENGINEERING CO., LTD.
Wellington Mill, Bolton Road
Blackburn, Lancs., England

SIMULTANEOUS EXTRUSION OF DIFFERENT COLOR MATERIALS FOR COLOR IDENTIFICATION

THE PERFECT ANSWER TO 2-COLOR EXTRUSIONS

for: Striping Identification
Color Coding
Wire Coating
Wire Insulation

Wire manufacturers with a coding problem will find the solution in this new vertical extruder.

This unit is complete and ready for production. It is designed to give you maximum versatility in operation. By means of a height adjustment and rotation of the top part, and by a spin of the barrel, any setup job becomes routine.

The Model 1250 B can be combined, in tandem, with any standard extruder in operations such as adding contrasting stripes to insulation wire.

MODEL 1250B VERTICAL EXTRUDER

WE WILL MAKE THE EXTRUDER AND DIES TO MEET YOUR SPECIFIC REQUIREMENTS. LET US KNOW YOUR EXTRUSION PROBLEM. WE WILL SOLVE IT AT NO ADDITIONAL COST.

Thermoplastic **Equipment**

Division of THERMOPLASTIC PROCESSES, INC.

VALLEY ROAD • STIRLING, NEW JERSEY

Most Experienced 2-Color Extruding Machine Firm In The World

Millington 7-1003 • Mitchell 3-4600 Nwk. • COrtland 7-6220 N.Y.C.

Here is COOK's combination fine

WIRE DRAWING and ANNEALING UNIT

. . . most compact, most complete machine of its kind ever designed!

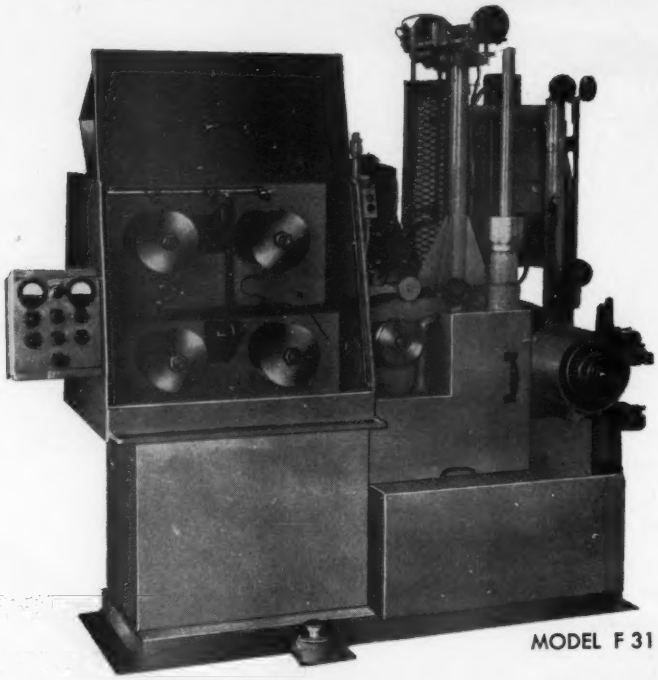
FLOOR SPACE only 6.5' x 3'

Heavy steel plate, all-welded construction • One central control panel • Over-driven spooler prevents slip and wear on finishing capstan • No scuffing or splintering of finished wire • Maintains uniform wire speed throughout entire spooler build-up • Wire tension can be regulated while machine is in operation • Die arrangement permits full horizontal string-up • Provides continuous run of clean, uniformly annealed wire in a complete range of sizes • Prevents wire discoloration • Eliminates double handling of wire and spools • Saves time because annealed wire is available when drawn • Runs efficiently at high speed • No power waste; no warped spools • Spare parts and machine service always available • Will give many years of trouble-free (24 hour-a-day) service at low operating and maintenance cost • This easy-to-operate machine is supplied complete with main drive motor and fully wired controls

ANNEALER ALSO AVAILABLE AS A SEPARATE UNIT ADAPTABLE TO OTHER MAKES OF DRAWING MACHINES

Annealer drive and control, including transformer, are an integral part of Model F31A . . . illustrated

You will recognize this as a greatly improved version of the famous, original COOK DRAWER-AND-ANNEALER



MODEL F 31 A

MACHINE SPECIFICATIONS

Maximum wire entering size . . . #14 B&S gauge • Finished wire size . . . #26 to 34 B&S gauge • Operating speed . . . 4,500 ft. per minute • Maximum number of dies . . . 16 • Number of drawing shafts . . . 4 • Size of die case . . . 1" x ½" thick • Motor size . . . 15 HP • Spool capacity . . . 40 to 90 lbs. • Spool flange diameter . . . 8" to 12" • Spool traverse . . . 6" to 8"

ANNEALER SPECIFICATIONS

Wire range . . . #26 to 34 B&S gauge • Electrical supply . . . 7.5 K.V.A. single phase • Power consumption relative to wire size

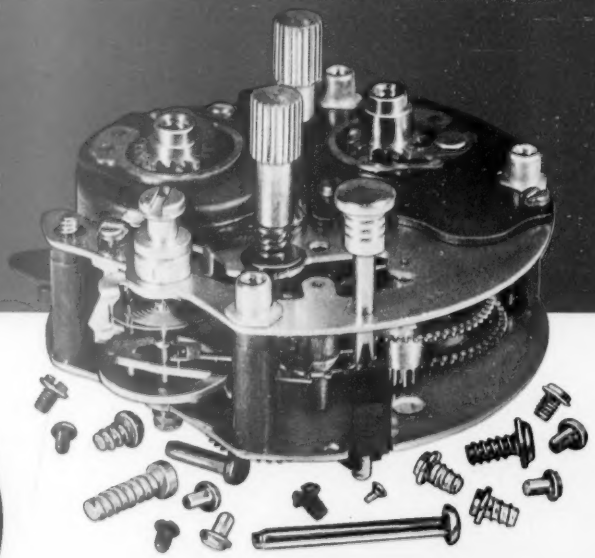
Call or write to COOK Manufacturing Co.

50 E. 25th ST., PATERSON 4, N. J., ARmory 4-6380

Wire and cable processing and fabricating machines

CANADIAN AGENT: E. V. LARSON CO., LTD., TORONTO
IN EUROPE: CAPAMADJIAN LE MONNIER CIE LTD., PARIS, FRANCE — KNOERZER & CO., STUTTGART, GERMANY

WESTCLOX extends die life with KEYSTONE WIRE



From precision parts—such as these fasteners made from Keystone "XL" Wire—come the quality that has made WESTCLOX the most famous name in timepieces.

The Westclox Division of General Time Corporation, LaSalle, Illinois, is the world's largest manufacturer of timepieces. For years, millions of their famous Big Ben and Baby Ben clocks have started the day for more people than any other timepiece.

Keystone "XL" Wire has played a key part in "clockwork" cold heading of the millions of tiny fasteners—rivets and screws—that are a part of the "works" inside. From small .032" to .116" Keystone wire, some 170,000,000 fasteners are headed in a year. Precision of such tiny parts is important for high-speed assembly of quality timepieces.

Fifteen years ago Keystone metallurgists were called in at Westclox . . . analyzed wire use . . . die design . . . and recommended a wire that solved an excessive die wear problem. Today, one special carbide die at Westclox has headed an estimated 4-million parts . . . and is still in use after 12 years of operation. Keystone "XL" Wire is the big favorite on Westclox fastener heading today.

The *flowability* characteristic of Keystone "XL" Wire is the secret of success . . . it's a wire that practically "flows" through dies to form the most extreme shapes . . . with less die wear . . . greater precision . . . reduced waste.

Want a Keystone Wire Specialist to help you save money and improve quality? Write for details!

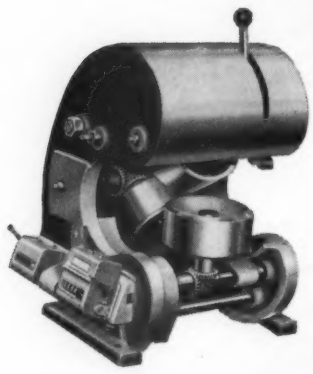
Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE XL WIRE STUDY

KEYSTONE

WIRE FOR INDUSTRY

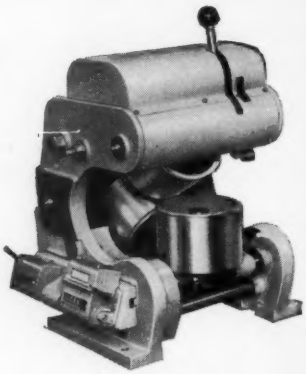
CALCULATED ACCURACY



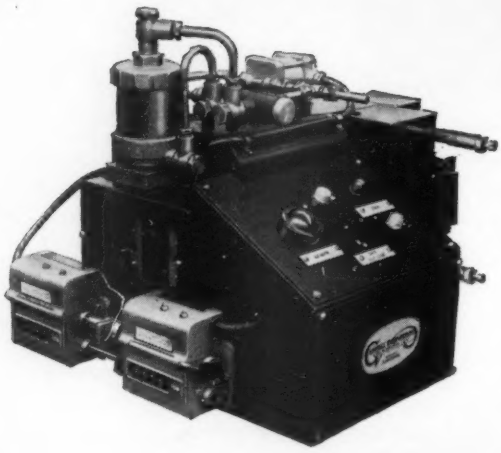
Are you interested in saving the wire, rope and cable you are now scrapping and giving away? "General" three-wheel length measuring machines are proved to be the most consistent and accurate obtainable. Used on many processing lines these machines are capable of any accuracy closer than 0.05%

GENERAL

GENERAL ENGINEERING CO (RADCLIFFE) LTD



The LV5 machine above is designed to handle cable or wire rope from ⅜ in. to 5 in. diameter, and to facilitate side entry.



The LV3 above will handle diameters between ⅜ in. and 3 in. Like the LV5 this machine permits side entry of the wire or cable.

The LV0 alongside is shown with automatic cutting attachment and surface fault detector. It will measure wire from 0.010 in. to 1 in. diameter.

Pre-determining counters with lever or automatic re-set. Dekatron electronic counters.

For full details complete coupon below.

GENERAL ENGINEERING CO (RADCLIFFE) LTD

Bury Road, Radcliffe, Manchester, England.

Please send me full details regarding your
LV0 ( ) LV3 ( ) LV5 ( )
measuring machines.

Send also details of your automatic
cutting attachment ( ),
surface fault detector ( ).

NAME .....

ADDRESS .....

.....

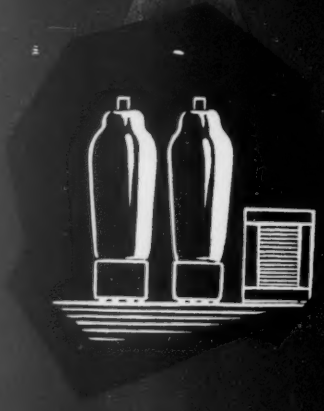
FIRM .....

W. W. P.

NEW DEVELOPMENTS CONTINUE!

DAMBERGER

This Drawing Unit (Type 554 plus Spooler SD4152) produces finished wires within a range of .8455ø and .8434, on spools up to 440 lbs. weight



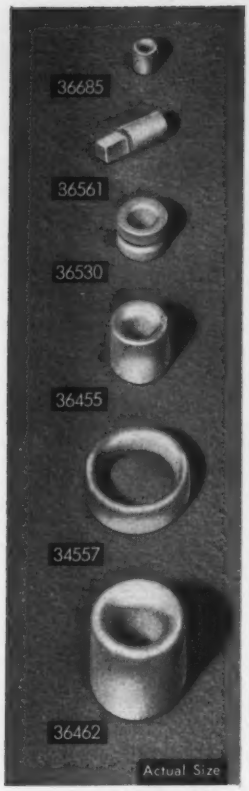
EXCLUSIVE REPRESENTATIVE FOR U.S.A. AND CANADA

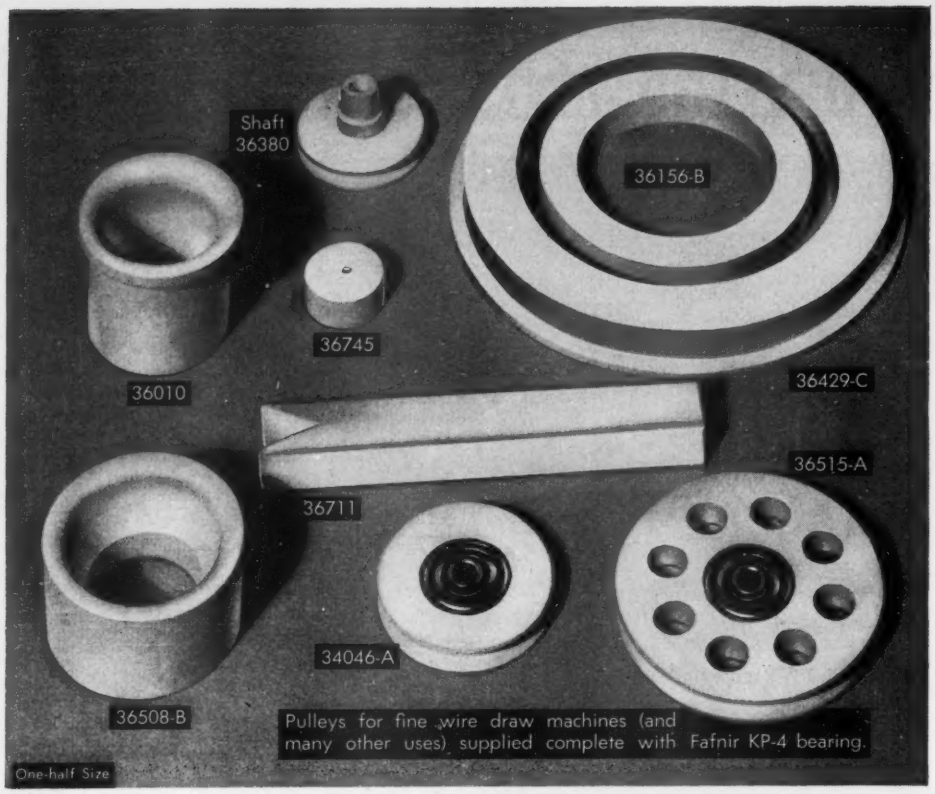
AMERICAN LAUBSCHER Corporation

TISK BLDG. 250 WEST 57TH STREET NEW YORK 19, N.Y.

NIEHOFF MACHINE WORKS

SCHWARACH / RHEIN / NIEDERRHEIN WESTERN GERMANY





AlSiMag guides for fine wire draw machines, bunchers, hold down guides, sheave applications and others.

AlSiMag® Alumina Ceramic WIRE GUIDES

More wear resistant than the hardest metals. Smooth. Hard. Non-corrosive. High heat resistance. Held to precision tolerances where necessary. Homogeneous. Since the material is the same all the way through, gradual wear simply exposes new surfaces of the same material.

AlSiMag guides are available in various degrees of finishes for specific applications.

Standard or custom designs. Wide range of shapes and sizes. Samples of present production sent on request. Test samples to your specifications supplied promptly at reasonable cost.

• For complete information, send sample of guide or drawing, together with details of your processes and materials.

A Subsidiary of Minnesota Mining and Manufacturing Company

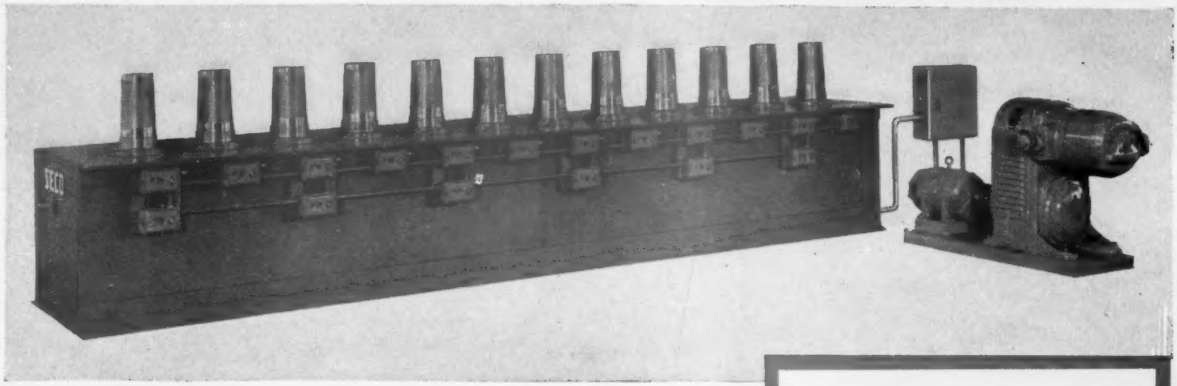
AMERICAN LAVA CORPORATION

CHATTANOOGA 5, TENN.
58TH YEAR OF CERAMIC LEADERSHIP

SALES ENGINEERS: NEW ENGLAND: W. J. Geary, 27 Fairlawn St., Cranston, R. I., Williams 1-4177. • NORTHEAST: J. S. Gosnell, 205 Walnut St., Livingston, N. J., WYman 2-1260. • SOUTHEAST: James W. Crisp, Route 4, Taylors, South Carolina, CHurchill 4-0063. ALL OTHER AREAS: J. B. Shacklett, W. M. Crittenden, Jr., or W. H. Cooper, American Lava Corporation, Chattanooga 5, Tenn., AM 5-3411. **REPRESENTATIVES:** CANADA: Ian M. Haldane & Co., P. O. Box 54, London, Ont. • ALL OTHER COUNTRIES: Minnesota Mining & Manufacturing Co., International Division, 99 Park Ave., New York, N. Y.

SECO Fine wire TAKE-UP FRAMES

The "last-word" in wire-winding efficiency!



- **Simplified Design and Construction**
- **Synchronized Electrical Variable Speed**
- **Noiseless, Vibrationless Running**
- **Greatly Increased Operating Capacity**

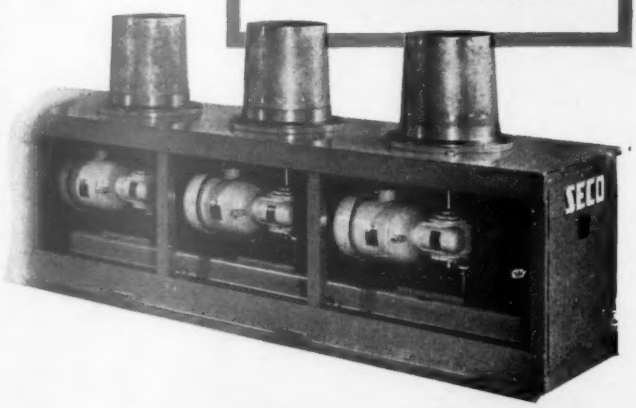
SECO builds take-up frames for handling fine gauge steel or non-ferrous wire on 8", 12", or 16" diameter blocks...with linear wire speeds up to 1,000 FPM or higher. Superior features include a multiple electrical drive system (alternating current) for synchronized electrical transmission of variable speed power.

This gives simultaneous speed changes to all spindle blocks, in ratios up to 5:1 or even 10:1 or higher. It provides push-button stop-start control to each of the gear motors driving each spindle block. Gone is the old bevel gearing, with manually operated clutches for starting and stopping the blocks.

SECO high production take-up frames are constructed to accommodate any number of spindles required. Frames with horizontal spindles can also be built. Call or write for complete information and data. Consultation invited—no obligation.

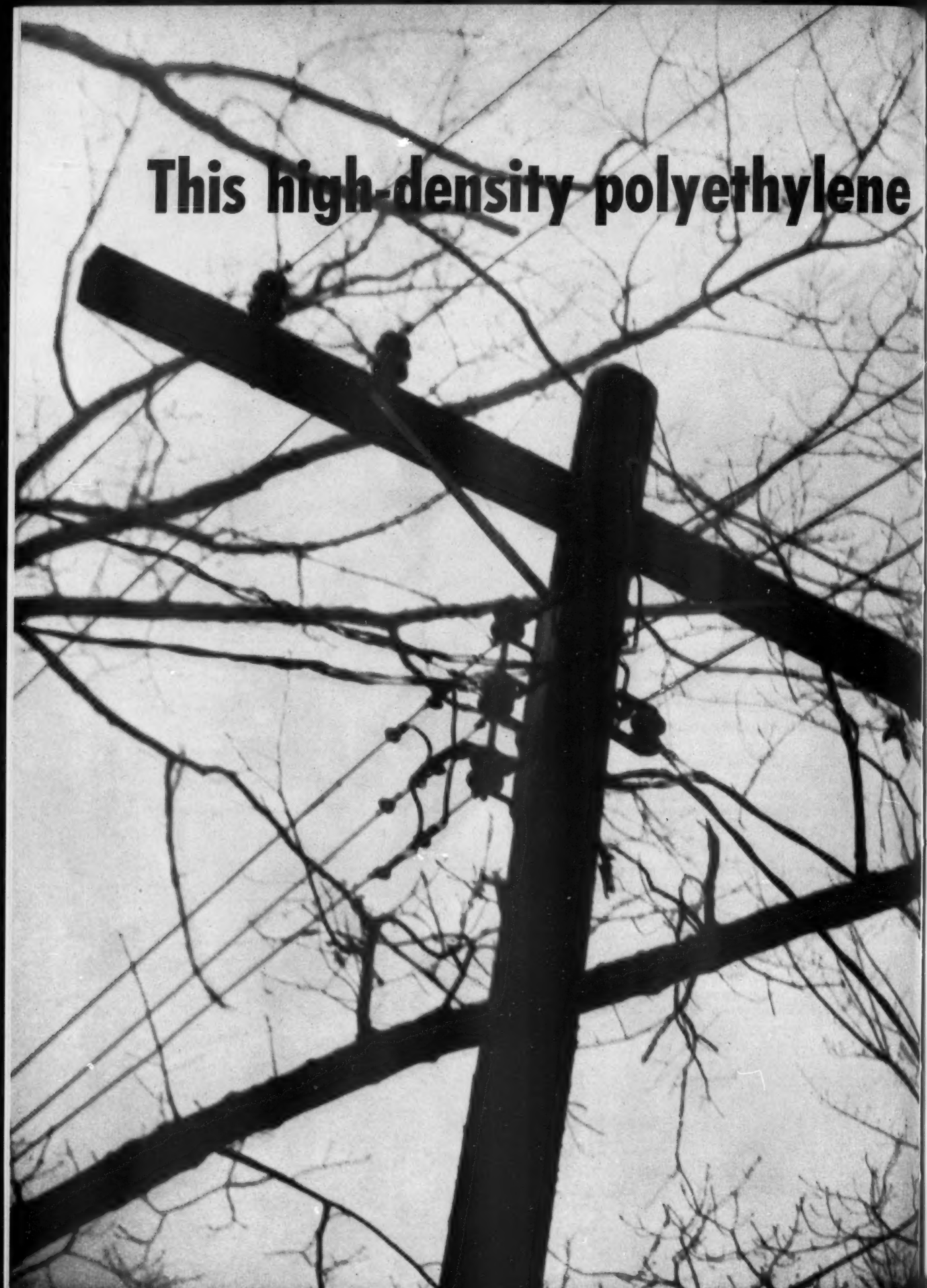
SHOWN ABOVE:
SECO Take-Up Frame and VARIDYNE Electrical Power Unit which provides synchronized variable speed to the multiple drives. AC current is employed throughout, and the VARIDYNE System "gears" all the drives together by electrical impulses.

SHOWN BELOW:
The AC squirrel-cage induction type gear motors which drive the spindle blocks through hollow bored shafts.



STEEL EQUIPMENT COMPANY
P. O. BOX 737, WARRENSVILLE STATION
CLEVELAND 22, OHIO

SECO


This high-density polyethylene

wears down tree limbs!

That's an indication of the abrasion resistance you find in BAKELITE Brand high-density polyethylene DGD-4100. In standard IPCEA tree wire abrasion tests, it withstood over 1,500,000 cycles . . . 50% better than other high-density polyethylenes tested! For utility companies, coverings of DGD-4100 mean less damage from trees and reduced outages.

In resistance to environmental and thermal stress cracking, DGD-4100 surpasses most high-density and conventional polyethylenes. These properties, along with improved toughness, shear strength, and weather resistance are attained without sacrifice of such familiar polyethylene advantages as light weight, excellent electrical insulating properties and ease of pull over cross-arms.

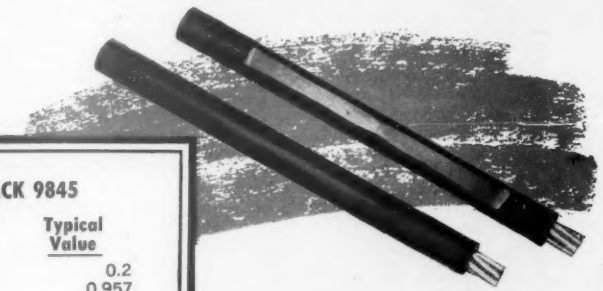
Progressive utility companies are already switching to BAKELITE high-density polyethylene. DGD-4100 has proved especially well-suited in power distribution systems for service drop and tree wire covering, as well as in line wire, aerial spacer cable and high-voltage power cable.

Test data and samples will tell you more about what BAKELITE Brand high-density polyethylene DGD-4100 can do. Write Dept. CW-40H, Union Carbide Plastics Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Union Carbide Canada, Toronto 7.

TYPICAL PROPERTIES "BAKELITE" DGD-4100 BLACK 9845

Properties	ASTM Test	Typical Value
Melt Index @ 44 psi (gms/10 min)	D 1238	0.2
Density	D 1505	0.957
Tensile Strength, psi	D 412	3400
Per Cent Elongation	D 412	250
Durometer Hardness, Shore Type "D"	D 676	58
Brittleness Temp., °C.	D 746	-95
Shear Strength, psi	D 732	3000
Stiffness in Torsion, @ 23°C., psi	D 1043	100,000
Tree Wire Abrasion Test	(1)	
50% Abraded (Cycles)		800,000 ca.
100% Abraded (Cycles)		1,500,000 ca.
Environmental Stress Cracking, F_{50}, hrs.	D 1693 (2)	500
Thermal Embrittlement Resistance, hrs. @ 70° C., F_0	(3)	5000
Deformation at 110 deg. C., per cent	(4)	0
Dielectric Constant	D 1531	2.65
Dissipation Factor	D 1531	.004
Dielectric Strength, Short Time, volts/mil	D 149	580

(1) IPCEA Tree Wire Test—S1981
(2) Samples previously aged 7 days @ 70° C.
(3) Standard U/L Heat Shock Test—1/32" insulation on #14 AWG solid copper conductor wrapped around its own diameter.
(4) UCPC Method WC 75 B/3—1/32" wall on #14 AWG wire. Test terminated at 5000 hrs.



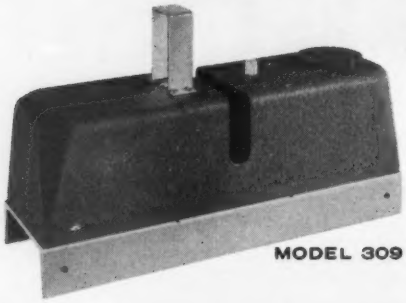
Samples of tree wire insulated with DGD-4100—before and after 1,500,000 abrasion cycles.

UNION CARBIDE

"Bakelite" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

A MICROLIMIT CONTROL
on your wire production line assures

- *optimum quality*
- *increased production*
- *closer tolerances*
- *savings in labor and materials*
- *reduced start-up wastage*



MODEL 309

MODEL 310

MICROLIMIT CONTROL offers the most reliable . . . sensitive . . . versatile *measurement and control of insulated wire dimension* available anywhere. These rugged, *noncontact gauges* provide a high degree of accuracy, *regardless of wire speed*. In many applications, MICROLIMIT CONTROLS can be mounted *right at the die* . . . can measure materials in a *highly plastic state* . . . even in hot or smoky atmospheres. Check the features and specifications below:

MODEL 309	MODEL 310	
Photoelectric pickup of obstructed light from a constant source—balanced against an unobstructed reference beam.	Photoelectric scanning by two light beams moving in tandem. Not affected by clouded atmospheres or deposits on lenses.	METHOD OF MEASUREMENT
Deviation signals are fed to control console. Its output drives a conversion unit to alter capstan speed or any other production variable. Timing circuits regulate degree of correction . . . permit corrected wire to register before further control is exercised. Complete integrated systems are available.		METHOD OF CONTROL
Thermoplastic and rubber insulated wire . . . extruded tubing, rods, shapes, filaments . . . special wires.	Thermoplastic insulated cable . . . C.V. process and pan-cure rubber cable . . . extruded tubes, shapes.	COMMON APPLICATIONS
.001/.025" . . . .025/.500" . . . .025/.750"	.075/1.0" . . . .075/2.0" . . . .075/3.0"	STANDARD RANGES
Direct setting with calibrated spindle . . . or, for utmost accuracy: 'zeroing' the deviation indicator on a standard reference rod.	Direct setting with digital knob control.	GAUGE SETTINGS
± 0.1 mil	± 1.0 mil	SENSITIVITY
Pan-cure rubber: between extruder and talc box. PVC & PE extruders: on either side of capstan. Teflon & Silicon extruders: between extruder and oven.	Generally: as close to die or extruder as desired.	RECOMMENDED LOCATIONS

For complete information, contact your local Weston representative . . . or write to Weston Instruments Division, Daystrom, Inc., Newark 12, N. J. *In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 19, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.*

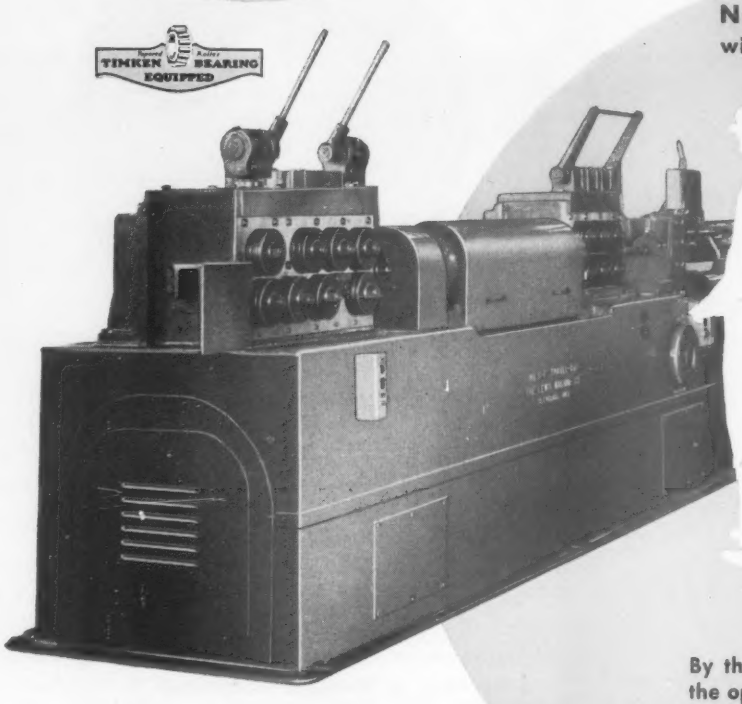
A DAYSTROM UNIT

DAYSTROM-WESTON
Industrial Gauges

LEWIS

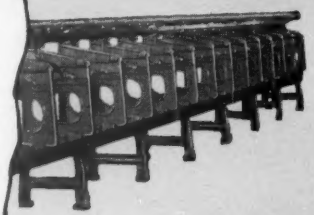
Machines can solve any wire straightening or cutting problems

TIMKEN BEARING EQUIPPED



No. 11-F TRAVEL-CUT
with special extension

This machine was engineered to meet special requirements for custom cutting a wide variety of concrete reinforcing bars up to 50 feet in length



SINGLE STATION OPERATION

eliminates waste time and fatigue by placing operator at one position

By the simple movement of a lever the operator can set the electric limit switch to cut any desired length from 6 to 50 feet. A dial graduated in feet and inches tells him the exact length the machine will cut. A preset counting device stops the machine when the proper number of pieces is cut.

Any predetermined number of pieces may be cut with this equipment to any predetermined length without the operator moving from his regular position at the machine.

There is a Lewis Machine design to straighten and cut all materials and shapes in wire and or bar stock from .012" to 1" diameter at a wide range of speeds. If you have a wire straightening and cutting problem, or special requirements for a job, ask us for information and suggestions about how Lewis Machines can increase your production, control your quality and greatly reduce your costs.

New illustrated brochure available on request.

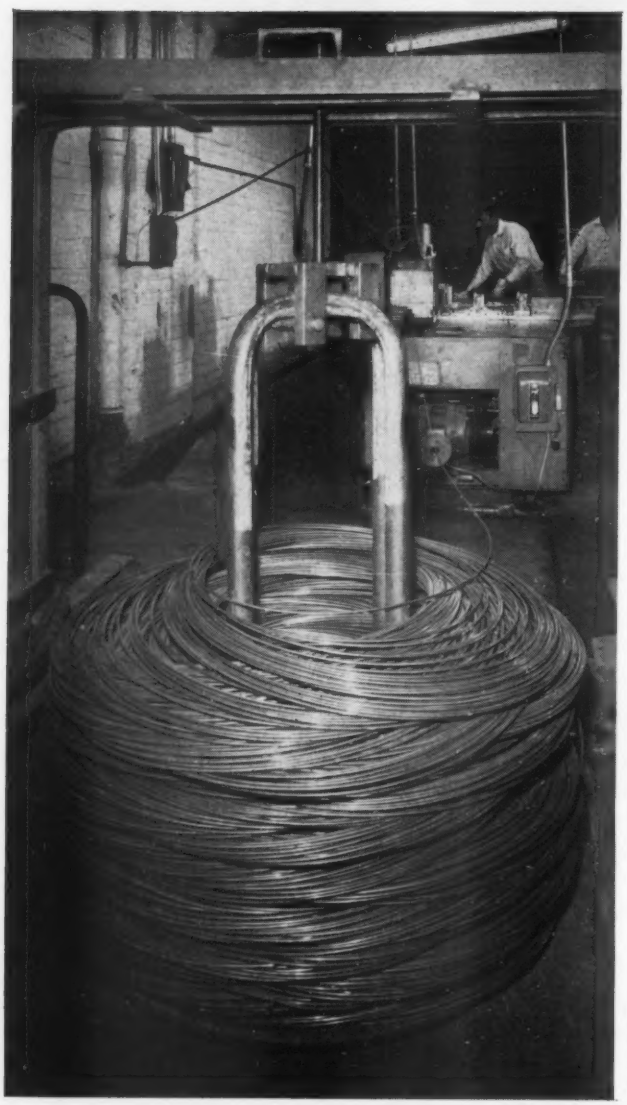
THE LEWIS MACHINE COMPANY

3441 East 76th Street • Cleveland 27, Ohio, U. S. A.

CF&I WIRE HELPS

PACKAGED for YOUR PRODUCTION

Compact shaped coil ready for shipment



"CF&I shaped coils have saved us 25% in storage, 20% in downtime, have increased our production by over 20%, and have enabled us to produce a higher quality product."—said Mr. Sol Lipshitz, president of Reforce Steel and Wire Corp., Brooklyn, New York.

Problem: "Previously with small coils, we had to stop our machine every 25 minutes to butt-weld the end of a new coil to the used-up coil. As we had to go to this trouble twenty times a day, we were losing 1½ to 2 hours daily in downtime," explained Mr. Lipshitz.

Solution: "A CF&I salesman carefully examined our operation; then he suggested that we use CF&I shaped coils which hold 2500 pounds of continuous length wire, as opposed to 200 or 300 pounds. As a result, we now stop our machine only once to start a new coil, instead of 10 times every day. We save nearly two hours, and have increased production by 20%.

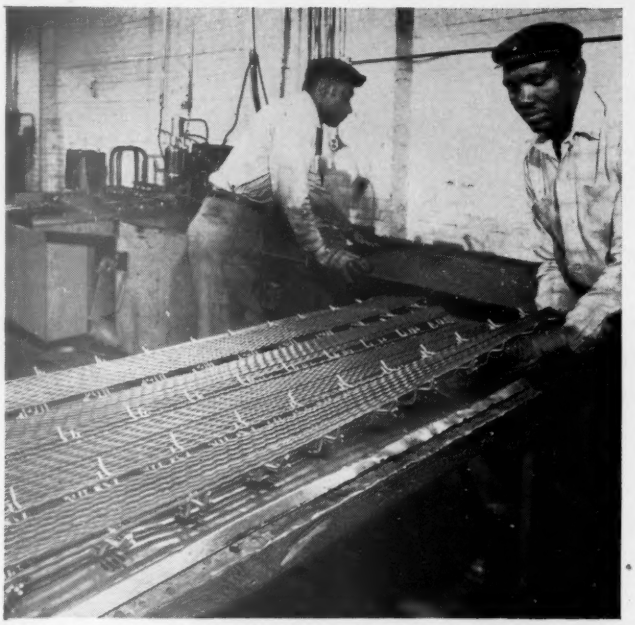
"In addition, CF&I shaped coils have greatly reduced unloading time. Now when we receive a truckload of wire, we unload and store 15 pieces instead of 200. This not only saves time, but freight expenses as well because we now store much more and have to order one-fifth as often."

CF&I heavy coil mounted on spider for pay-off. This heavy coil contains 2500 pounds of continuous length of wire—enough wire for one-half day's production at the Reforce Steel and Wire Corp. "By virtually eliminating downtime with these heavy coils, we have increased production by 20%," said Reforce's president.

CUT DOWNTIME 20%

at Reforce Steel and Wire Corporation, Brooklyn, N. Y.

Heavy coils are quickly and easily placed on a revolving spider. The spider, which is leased from Wickwire, acts like a spool and assures smooth, even pay-off. "Because our machine jerks rather than drawing steadily, the small coils frequently pulled over and became tangled," explained Mr. Lipshitz. "CF&I heavy coils on spiders give us a steady flow of wire and make our operation more uniform."



Here you see some of Reforce's finished reinforcing accessories. "CF&I heavy coils have increased the quality of our product," said Mr. Lipshitz. "Small coils require frequent coil end welding. Sometimes, due to different coil melting temperatures, our automatic welding machine failed to make a good bond, forcing us to re-weld some faulty joints. CF&I long length coils have eliminated this problem."

Choose the CF&I wire package that offers one or more of the following benefits for your production:

- less downtime with extra-long lengths of wire
- quick unloading and easy in-plant handling
- simplified inventory control
- assured cleanliness of the wire

Our salesman will be glad to study your operation and recommend the wire package that will save you time and money. Call the nearest CF&I office today to set up a "no obligation" appointment.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

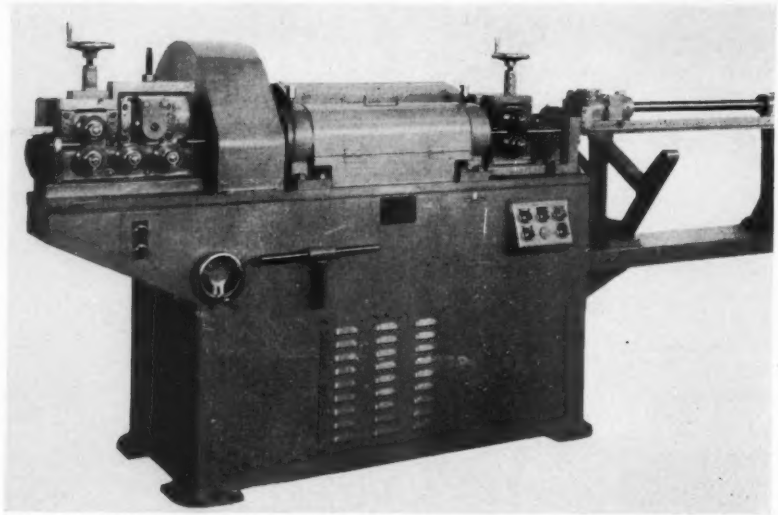
CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Odessa (Tex.) • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City San Francisco • San Leandro • Seattle • Spokane • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg 6946

If you use wire up to 3/8", this new SHUSTER is just for you!



SINCE 1866

These new SHUSTER wire straightening and cutting machines incorporate new advantages to give you higher production—for less cost. The 2ABV variable speed unit straightens and cuts round wire from 5/32" to 3/8"; the 2ABVF straightens and cuts shape stock up to 1/4" square.

The new machines include an improved, vertical drive 5-roll gear driven preliminary straightening unit, and feed roll housing, both Timken bearing equipped. The new SHUSTER'S can automatically cut lengths up to 14" at the rate of 140 pieces per minute, and provide infinite variable speed within all feed and cutoff ranges. This machine may also be purchased as a constant speed unit (150 f.p.m.).

Want more details? Send this coupon today!

Gentlemen:

☐ Please send me complete specifications and prices on the 2ABV-2ABVF SHUSTER.

☐ Send me specifications and prices to meet the following wire straightening requirements: .....

.....

Name .....

Address .....

City ..... *State* .....

SHUSTER FEATURES:

1. Higher speed five die straightening arbor, mounted on ball bearings for minimum vibration.
2. Electric trip mechanism on target.
3. Solenoid-operated roll-type clutch.
4. Electric control Panels— two position operation.
5. Totally enclosed feed roll housing and prestraightener with shafts mounted on Timken Bearings. Gears in oil.
6. Electric Brake on clutch shaft.
7. Wide range Reeves Variable Speed. 50 to 200 F.P.M.
8. Wire size range: 5/32" to 3/8" diameter basic wire.
9. Gear driven preliminary 5 roll straightener, mounted in vertical position.

METTLER MACHINE TOOL, INC.

155 W. Adeline Street • New Haven, Connecticut

NOMINAL WEIGHTS OF FINISHED WEATHER-RESISTANT WIRE AND CABLE
Copper & Copper Alloy Conductors
Aluminum Conductors
Polyethylene Type
Neoprene Type
Polyethylene Type
This table shows
POLYETHYLENE covere
I HAD THE BOSS UP A POLE...
DON'T GET ME WRONG...I STILL DON'T LIKE STORMS
"But they don't seem to hit us so hard any more.
Not since polyethylene coated wire came along."

TELLING THE POLYETHYLENE WIRE STORY CAN BUILD FUTURE PROFITS FOR YOU

Polyethylene-covered line wire has many advantages for users: Exceptional weather and stress-crack resistance. Easy handling and installation. Long life in service. Fewer outages and minimum maintenance.

We've been telling your customers the polyethylene story in utility magazines through advertisements like those above. And more and more users are specifying polyethylene covering for line wire and many other applications. Why not join us in this effort?

Polyethylene can make your operations simpler, with a more profitable future too.

- The resin comes ready-to-use – nothing to add, no blending, no milling, no post-extrusion vulcanizing. With production based completely on polyethylene, one line replaces several, providing savings in equipment, floor space, maintenance and labor. And there's only one material to purchase and inventory.
- Unlike costs of other insulating materials, which are trending upward, polyethylene price history promises long-term stability. This means polyethylene can be expected to be your most profitable line wire coating in the years ahead.

You can build a solid base for future sales and increased profits by promoting polyethylene line wire now among your customers and prospects.

As you make recommendations, you will find our new data sheet, "PETROTHENE® Resins for Wire and Cable Industry", helpful in selecting resins with the proper balance of properties for different applications. Also available is U.S.I.'s comprehensive 100-page "PETROTHENE Polyethylene . . . A Processing Guide." Write for your copies.

U.S. Industrial Chemicals Co.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.

Please send me:

☐ "PETROTHENE Resins for the Wire and Cable Industry"
☐ "PETROTHENE Polyethylene . . . A Processing Guide"

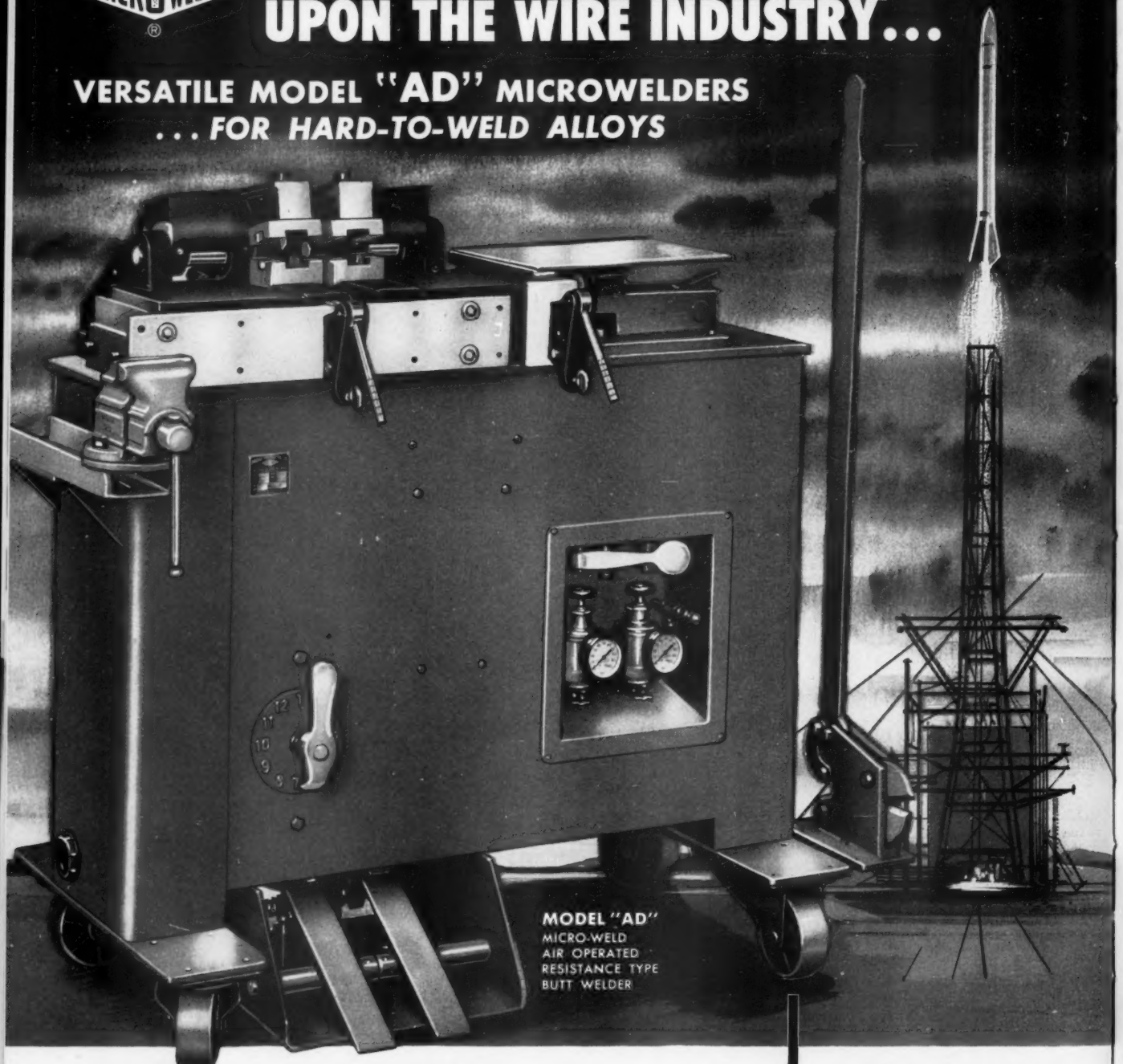
Name_____
Title_____
Company_____
Address_____
City & State_____

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities

MICROMETER PRECISION MICRO-WELD ®

DESIGNED TO MEET NEW DEMANDS UPON THE WIRE INDUSTRY...

VERSATILE MODEL "AD" MICROWELDERS
... FOR HARD-TO-WELD ALLOYS



MODEL "AD"
MICRO-WELD
AIR OPERATED
RESISTANCE TYPE
BUTT WELDER

In this modern age of rockets and atomic projects new demands are being made daily upon the wire industry. Close and continuous contact with the wire industry has resulted in a steady flow of improvements in MICRO-WELDERS to meet specific welding requirements.

Equipped with foot operated air clamps, with adjustable air control, two stage air operated upset mechanism with high pressure finish for forge action, 12 step quick action heat tap switch, straight slide water-cooled headpieces.

AVAILABLE IN THREE MODELS

AD-3
1/4" to 1/2" diam. alum. and alum. alloy
1/4" to 3/8" diam. copper and copper alloy
1/4" to 3/8" diam. steel and steel alloy

AD-4
3/8" to 3/4" diam. alum. and alum. alloy
3/8" to 5/8" diam. copper and copper alloy
3/8" to 5/8" diam. steel and steel alloy

AD-5
1/2" to 3/4" diam. alum. and alum. alloy
1/2" to 3/4" diam. copper and copper alloy
1/2" to 3/4" diam. steel and steel alloy

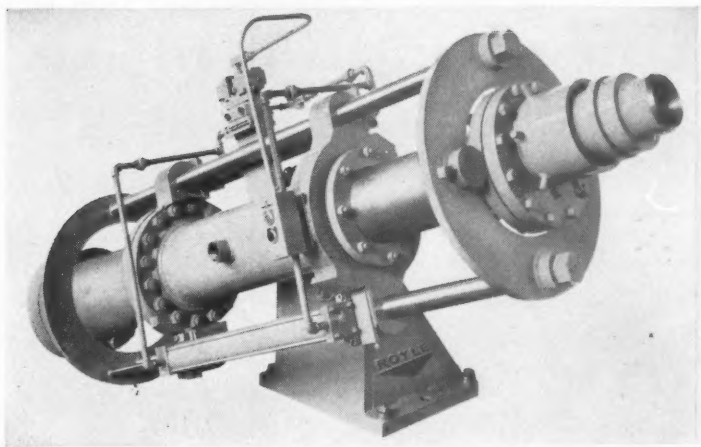
MICROMETER PRECISION MICRO-WELD ®

MICRO PRODUCTS CO.

20 NO. WACKER DRIVE • CHICAGO 6, ILLINOIS • TELEPHONE STate 2-7468

ROYLE

helps take the problems out of high voltage cable production



Another "first" for the Wire Industry from Royle is the complete, new Royle line of Splice Boxes for Vector* and conventional CV. Pneumatically powered Royle Splice Boxes will cut down-time costs and speed up operations.

Vector* Splice Box

If high voltage cable is creating production problems for you, Vector* CV could prove to be the answer. Vector* CV has shown its production ability day in and day out—with large and small cable—long and short lengths.
All types are economically produced with versatility, full cycle vulcanization and pressure cooling at speeds usually associated with horizontal CV.

Royle patented Auxiliary Seal assures economical production of short length cable.

Royle Auxiliary Equipment:

Engineered Capstan Systems
Splice Boxes
Roller Feed Hoppers
Take-Ups
Vulcanizing Tubes (conventional and catenary)
Pressure Cooling Systems
Pump and Seal Assemblies

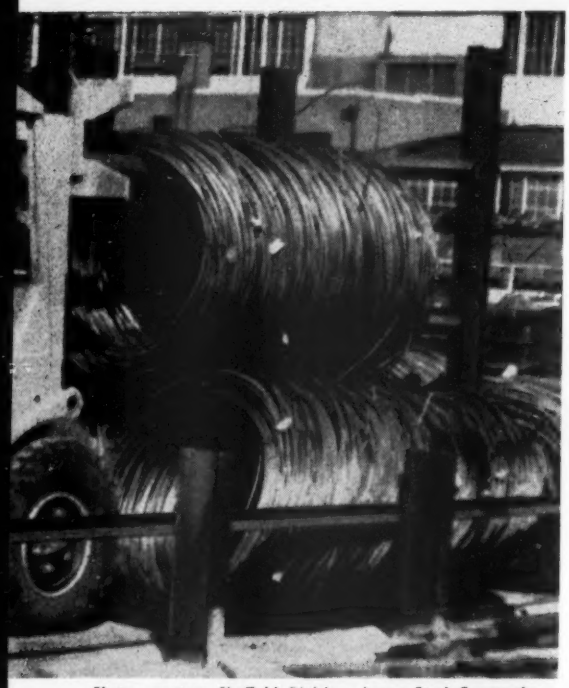
Call your Royle Engineer—have him design a Vector* CV tailored to your specific requirements . . . all without extensive—and expensive—building alterations.

**Patented*

ROYLE
Paterson, N. J.

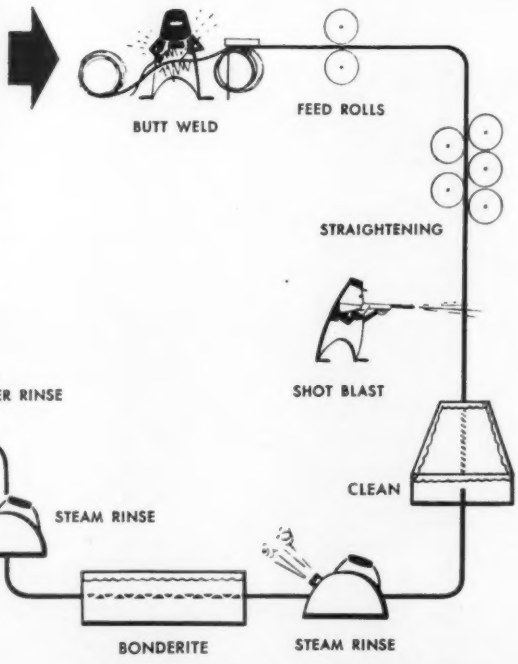
JOHN ROYLE & SONS
John Royle & Sons, 10 Essex Street, Paterson 3, New Jersey
Pioneered the Continuous Extrusion Process in 1880

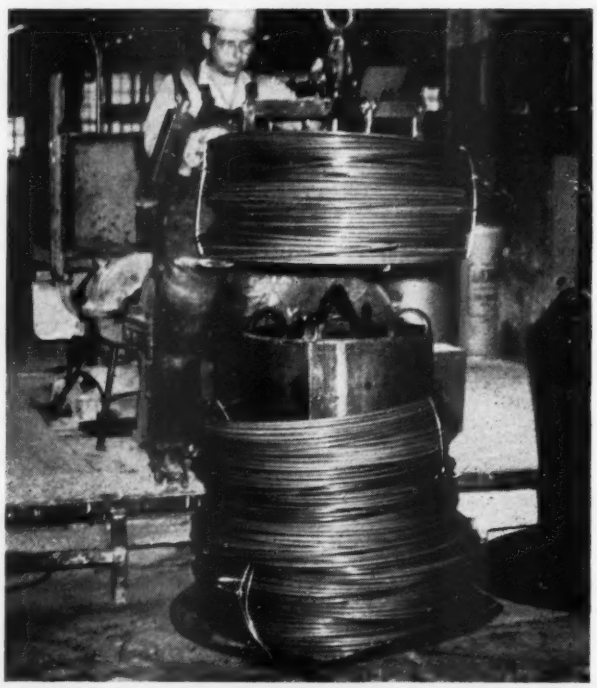
Home Office, V. M. Hovey, J. W. VanRiper, SHerwood 2-8262. **Akron, Ohio,** J. C. Clinefelter Co., BLackstone 3-9222. **Downey, Cal.,** H. M. Royal, Inc., TOpaz 1-0371. **London, England,** James Day (Machinery) Ltd., Hyde Park 2430-0456. **Tokyo, Japan,** Okura Trading Company, Ltd., (56) 2130-2149.



Photos courtesy Sheffield Division, Armco Steel Corporation

***HOT ROLLED ROD**—With Stran Bonderite in your plant, you can store rod in the yard. Schematic drawing shows processing.*





***SIZED OR FINISHED WIRE**—Wire, finished with the aid of Stran Bonderite, is readied for storage before going to cold heading machines.*

STRAN BONDERITE

revolutionizes cold heading and high carbon wire drawing in a continuous operation

Now—with Stran Bonderite—Parker has scored another breakthrough, this time in cold heading and wet or dry high carbon wire drawing.

This revolutionary development treats rod or wire in a continuous strand, creating a uniform coating and lubrication in a few seconds as the strand moves at production speeds.

The Stran Bonderite system produces cleaner wire, eliminates acid disposal problems and saves space. All this is accomplished with substantial overall cost savings and reduced labor.

An added benefit is the increased corrosion resistance afforded by the Bonderite coating, even after it has been through the dies. Finished coils remain rust-free and ready for use.

COLD HEADING—Manufacturers who have installed the revolutionary new Stran Bonderite system are reporting these benefits:

- *Improved lubrication makes it possible to do more difficult jobs.*
- *Tool life is greatly improved.*
- *Better dimensional tolerances are held.*
- *Residual coating increases die life in thread rolling.*

HIGH CARBON WIRE DRAWING—Among the advantages of Stran Bonderite in wet or dry high carbon wire drawing are these:

- *Improved lubrication eliminates many of the problems in the production of drawn shapes.*
- *Stran Bonderite greatly increases die life which results in close dimensional tolerance over long production runs.*
- *The chemically applied coating retains lubrication more effectively to permit higher drawing speeds.*

Since 1914 — leader in the field

Stran Bonderite is ready to save you money in your plant—and give you a better product. It has been thoroughly production tested.

We will be glad to tell you how it is saving money for many manufacturers today, how it will fit economically and efficiently into your operations. (Bonderite is also available for immersion application where conventional pickle house preparation is used.)

Write or call for expert help today!

Parker Rust Proof Company

2181 E. MILWAUKEE, DETROIT 11, MICHIGAN

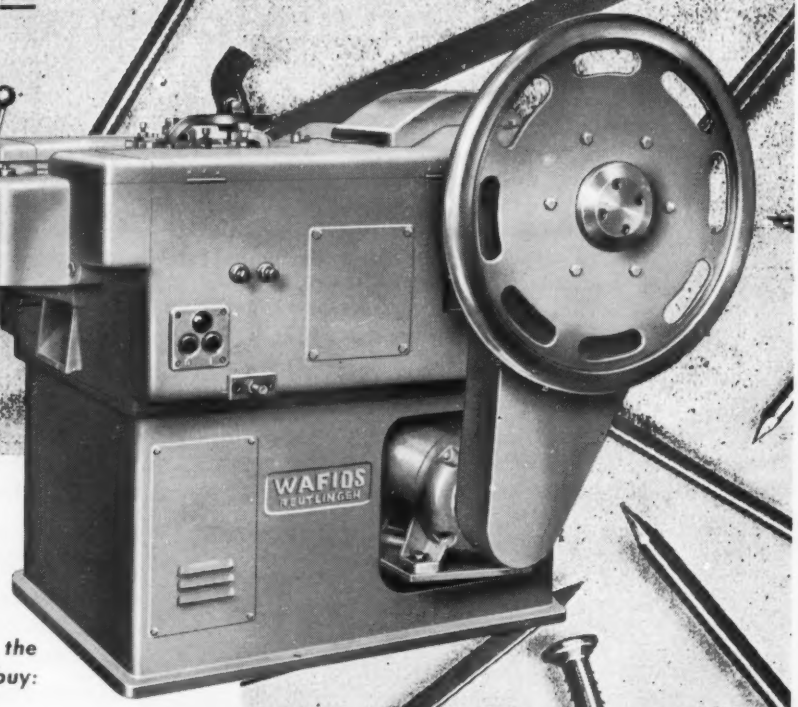
BONDERITE corrosion resistant paint base | BONDERITE and BONDERLUBE aids in cold forming of metals | PARCO COMPOUND rust resistant | PARCO LUBRITE—wear resistant for friction surfaces | TROPICAL—heavy duty maintenance paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

NEW! Nail Press

PRODUCES UP TO 900 NAILS PER MINUTE!

All Commercial Sizes—
Many Special Types
Including Staples



Greater Versatility and
Higher Production Capacity

WAFIOS

Type "N"

Features that make the Type "N" your best buy:

- Centralized automatic lubrication
- Clean, modern design
- Sturdy, compact construction
- Unequalled high output
- Great versatility
- Safety in operation

Write For the Complete Story In Our Bulletin #410

WAFIOS MASCHINENFABRIK
WARNER, FICKER & SCHMID
REUTLINGEN, GERMANY

U. S. Sales Office: **WAFIOS MACHINERY CORPORATION**
61 HUDSON STREET • HACKENSACK, N. J. TELEPHONE: HUbbard 9-7572
Canadian Office: O. Hrbaricky, 108 Givins St., Toronto, Canada

Are You Getting What You Pay For?

When you pay for HIGH QUALITY high-carbon wire, you want to be sure you get it. You do, when it is supplied by Roebling.

It is unsurpassed in quality, consistently true to specifications, and absolutely uniform in gauge. Hundreds of manufacturers attest to this fact . . . the qualities that they *pay* for—they *get* in Roebling high-carbon wire. The length of our relationship with customers proves it.

We'll be glad to show you what we mean. For information on superior high-carbon wire or cold rolled strip, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

This lightweight "No Charge" spool is typical of Roebling's modern packaging methods that save customers time and money.

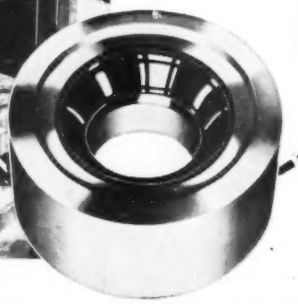
ROEBLING

Branch Offices in Principal Cities—Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

ANOTHER TALIDE CASE HISTORY . . .

Talide® Dies Cut Maintenance Costs at REVERE COPPER!



REVERE COPPER & BRASS, INC., ROME, NEW YORK, producers of copper clad, stainless steel kitchenware

found aluminum bronze dies gave better production than steel alloy dies, but maintenance costs still remained high. Over 500,000 one-quart sauce pan bodies were being drawn with each aluminum bronze die costing $250, but it cost another $900 to maintain the die in operation.

It was necessary to hand polish the die in the press every 2,000 pieces. After each 10,000 piece run, the die had to be taken to the tool room to have .010 to .030 of stock removed from face to clean up. Downtime and maintenance expense was costly.

A Talide die costing $1150 was installed and production now averages over 1,000,000 pieces with no visible wear. It was only necessary to hand polish the carbide die several times during the break-in period while drawing the first 30,000 pieces, with subsequent servicing negligible. More uniform, accurate-to-size parts are produced with scoring eliminated. No subsequent buffing operation on the piece part is required.

During the past 15-year period Revere Copper has installed over 30 Talide dies on their production line—pressing to shape a broad variety of kitchenware items, including sauce pans, covers, double boilers, percolators, handles, etc. Although millions of piece parts have been drawn to date, no Talide die has yet been worn out!

WIRE DIES

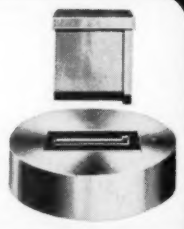
Hundreds of miles of steel and non-ferrous wire—.004 to .750—drawn through TALIDE dies.

COLD EXTRUSION DIES

50 times more valves and tappets cold extruded with solid TALIDE punches and dies.

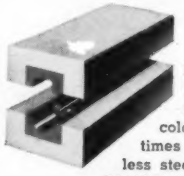
BLANKING AND FORMING DIES

70 times more paper discs blanked out with TALIDE—over hard alloy die.



CURLING ROLLERS

TALIDE curling rolls last 65 times longer than steel rolls on beverage can forming operation.



SWAGING DIES

Leading fountain pen manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.

HEADING AND EXTRUSION DIES

Cold heading ¼" C-1008 rivets, TALIDE dies produced 11,200,000 pieces, other carbide dies only 3,500,000.

POWDERED METALLURGY DIES

Compacting highly abrasive chemical powders, TALIDE pill dies last 4 months; steel dies wore out in 6 hours.

A Talide die engineer can help you cut costs and increase production on draw presses, punch presses, pill presses, cold headers, swagers and draw benches.

METAL CARBIDES CORP.
6001 Southern Boulevard
Youngstown 12, Ohio
Send for 68-Page Catalog 59-G

METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 12, OHIO

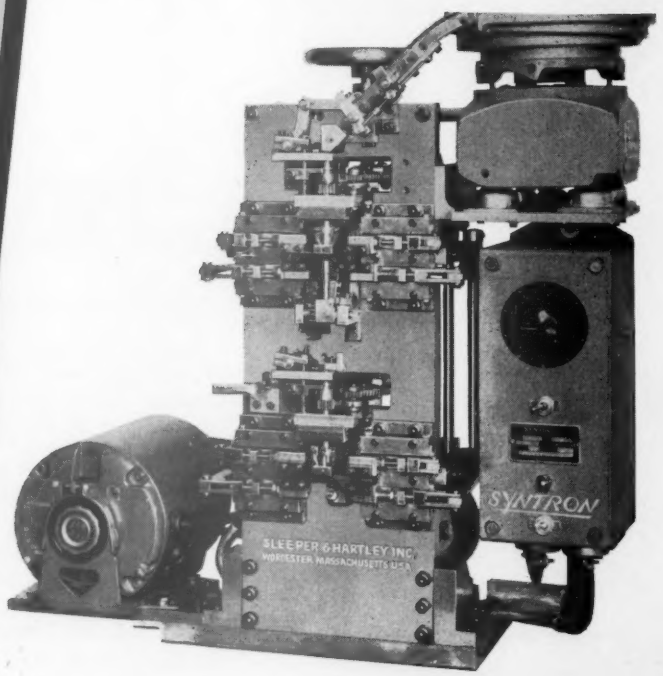
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

A NEW MACHINE THAT PAYS FOR ITSELF IN SIX MONTHS . . .

NEW
S & H #0
AUTOMATIC
SPRING LOOPER
Series #750

Here is the most revolutionary designed looping machine to hit the spring industry in years. It enables you to loop your extension springs five to six times faster than with conventional methods. Hopper fed, it loops both ends of extension springs in one operation.

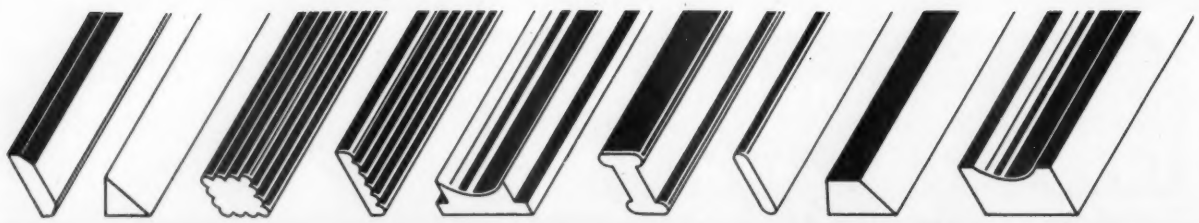
Time consuming set-up procedures, usually encountered with Automatic Coiling-Looping Combinations are eliminated, saving time, labor and money. Length Range — ¼" to 1½"; Max. O.D. — .200; Wire Range — .010 to .025; Production — 3000 springs per hr.

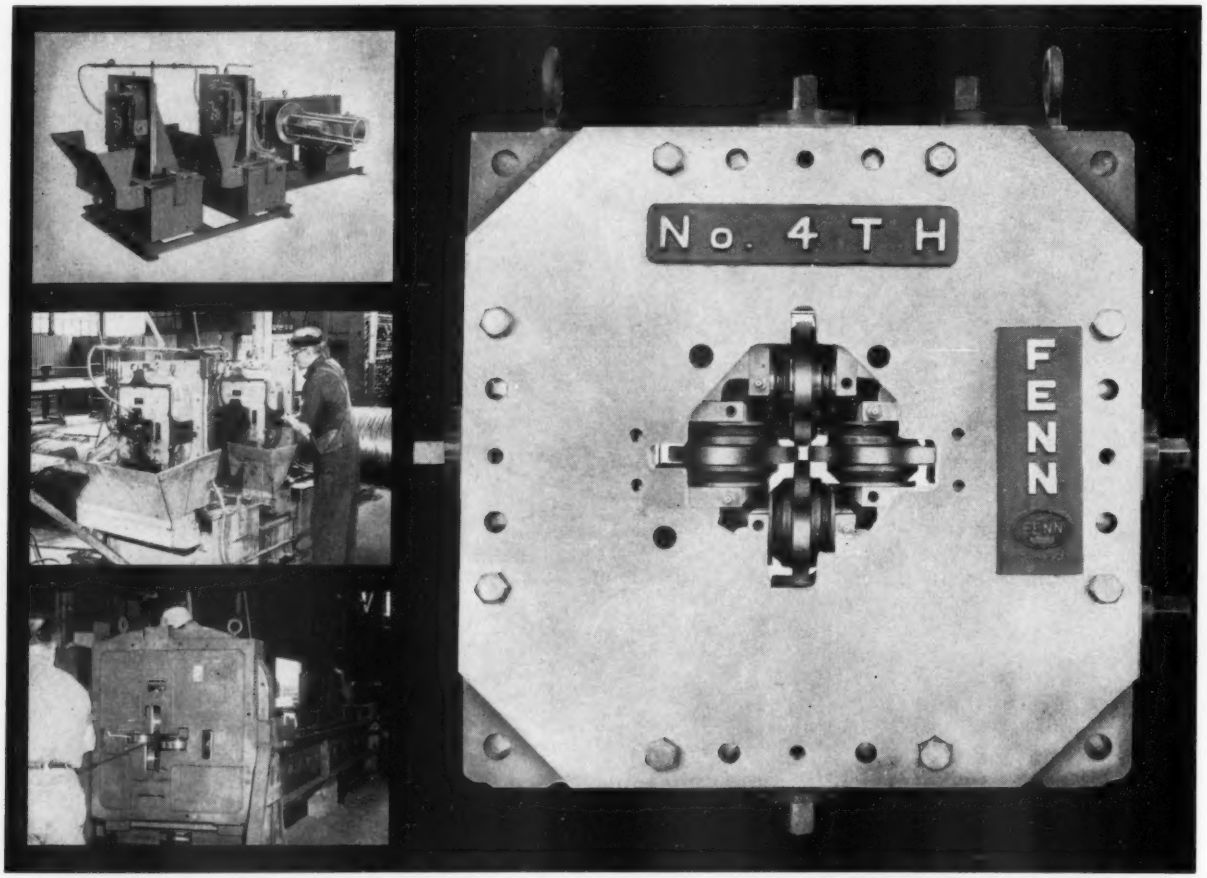


Write for further information

SLEEPER & HARTLEY INC.
335 CHANDLER STREET
WORCESTER 1, MASS., U.S.A.

ORIGINAL MANUFACTURERS OF UNIVERSAL SPRING COILERS

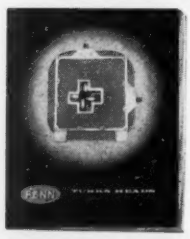




Top and Center — *Wire Shaping Mills with tandem Turks Heads.* Bottom — *Turks Head with Draw Bench.* Right — *Fenn Combination Type Turks Head.*

Wire Shaping with FENN Turks Heads

Fenn has pioneered the development of the Turks Head to their present day wide usage for precision production wire shaping. Used on the Wire Shaping Mill (developed by Fenn), on draw benches, or in tandem with Rolling Mills, Fenn Turks Heads produce many precision shapes, both plain and special, such as shown above, with both ferrous and nonferrous wire and rod. They aid in size control, and impart a fine surface finish. Fenn manufactures a complete line in plain, universal, combination and triangular types with bearing capacities at 100 RPM up to 56,400 pounds for heavy reductions. Fenn also makes the important accessories, such as capstans and take-up reels. If it's a wire-shaping problem or requirement, chances are Fenn can help you. Fenn's central engineering department and field engineers are ready to assist you. A copy of the Turks Heads Catalog No. TH56 will be promptly sent upon request.



The Fenn Manufacturing Company, Newington, Conn.

WHITACRE 22″ WIRE DRAWING DEAD BLOCK

Continuous Production—Efficiency Approaching 100%

Gives you these advantages

Continuous increased production achieved by: • No down time for stripping • Permits packaging into stationary container or uninterrupted palletizing on stems • No tangling nor snarling from handling • Design simplicity. No back-gearing nor similar mechanisms • Greatly reduced floor space requirements • Dies in supplying drawing machine can be changed without stopping dead block • Accumulation type machines can be "run down" without stopping dead block • Continuous inspection and sampling • Breaks welded in production — low scrap loss • Increased production with lessened operator fatigue • Maintenance eliminated except for occasional lubrication of four main bearings and two motor bearings • Dead block can be located anywhere with wire literally piped from wire drawing machine • Extra large packages for in-process wire • Greatly reduced handling and in-plant transportation costs • Low capital investment.

OTHER MODELS AVAILABLE

16″ Wire Drawing Dead Block, Model DB-16A • 26″ Wire Drawing Dead Block, Model DB-26A • Combination 16″ and 22″ Galvanizing or Tinning Dead Block Take-ups, Model GB-2216A • 26″ Heavy Wire Galvanizing or Tinning Dead Block Take-up, Model GB-26B.

Write Today For Specifications And Name Of Nearest Distributor

WHITACRE ENGINEERING & MANUFACTURING COMPANY

5649 ALHAMBRA AVENUE • LOS ANGELES 32, CALIFORNIA • CAPITOL 5-2476

WHITACRE

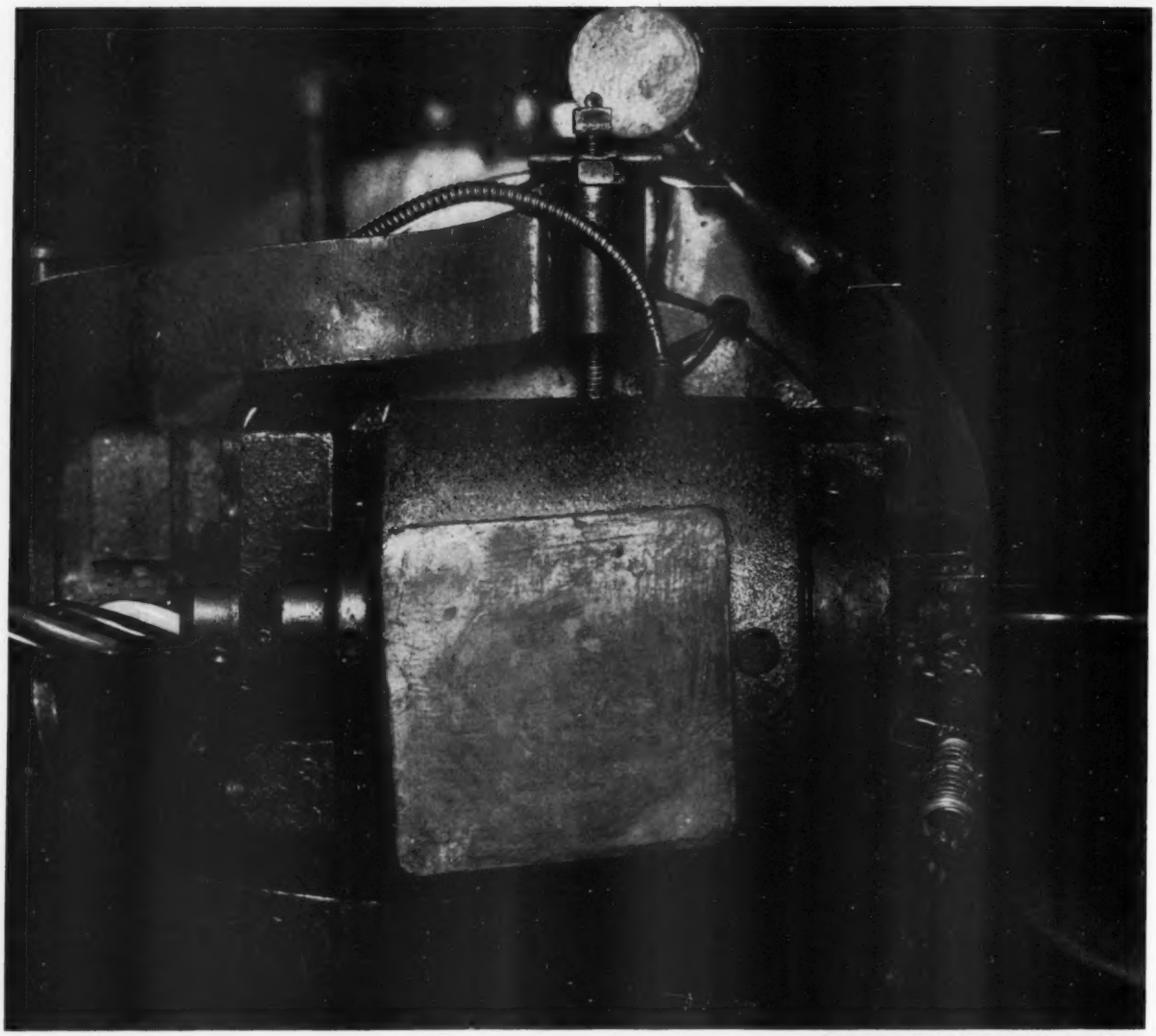


Photo courtesy Ideal Wire Products Co., Lowell, Mass.

Need a quality resin accepted and approved for electrical applications?

VYGEN 120 PVC resin is UL-approved as interchangeable with other quality PVC resins for wire insulating applications. VYGEN 120 is specially formulated for fast economical dry-blend extruding, with monomeric or polymeric plasticizers. It assures a lack of gelled particles . . . provides excellent heat and light stability plus exceptionally long life. See how VYGEN can help your products . . . speed your production . . . send for complete technical literature today!

VYGEN®

VYGEN 6812 COMPOUND
UL-approved for UF-NMC cable Type T, TW, 60°C Oil, and 80°C appliance wire applications. May also be used as primary insulation for other cable constructions and jacketing.

VYGEN 6035 COMPOUND
UL-approved for Type T, TW, and exposure to oil use at 60°C. This compound combines excellent physical and electrical properties with very good weather and flame resistance.

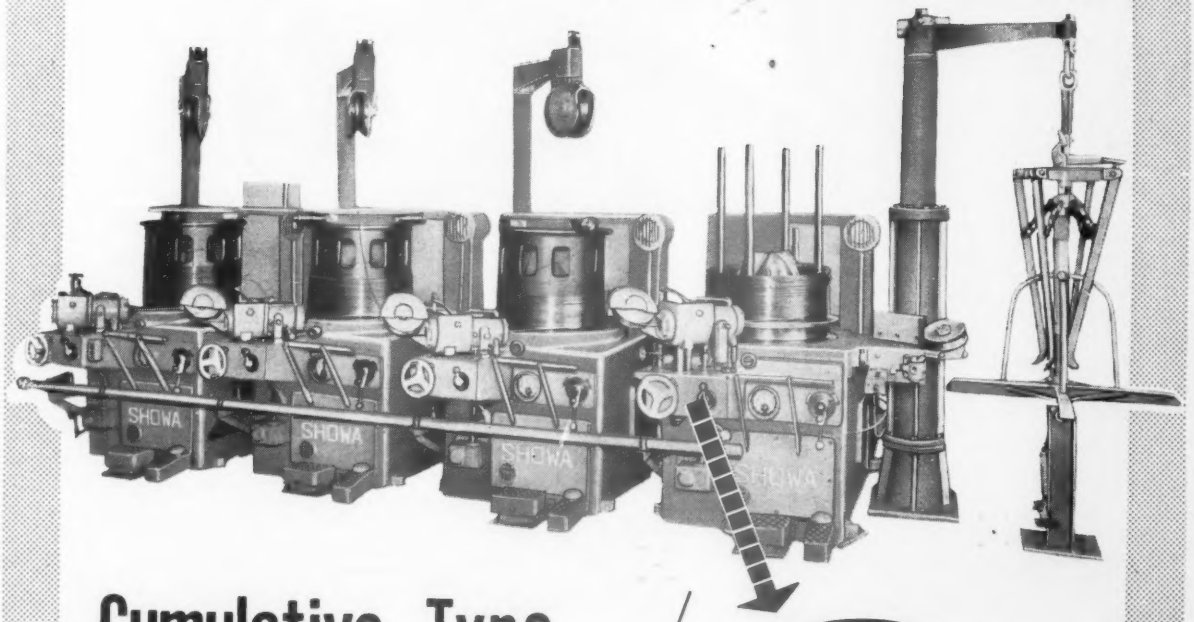
VYGEN 9221 COMPOUND
Meets UL requirements for 90 and 105°C applications. Recommended for appliance, radio hook-up, machinery wire etc. where heat resistance and good physical properties are required.

Creating Progress Through Chemistry

Chemical Division GENERAL

THE GENERAL TIRE & RUBBER COMPANY
Chemical Division · Akron, Ohio

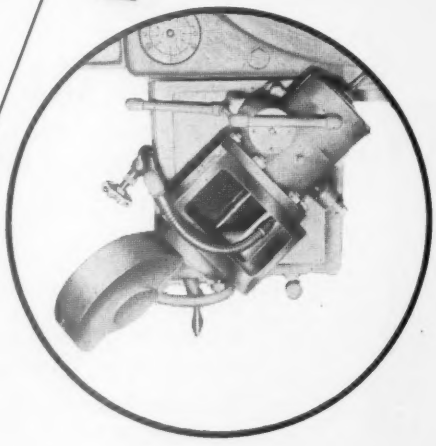
Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* **GENTHANE** *polyurethane elastomer* • **ACRI-FLO** *styrene-acrylic latices* • **VYGEN PVC** *resins and compounds* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*



Cumulative Type Wire Drawing Machine

for

whole material



Special Attachment

REVOLVING DIE HOLDER

★Perfectly round wire.
★Uniform die-wear.

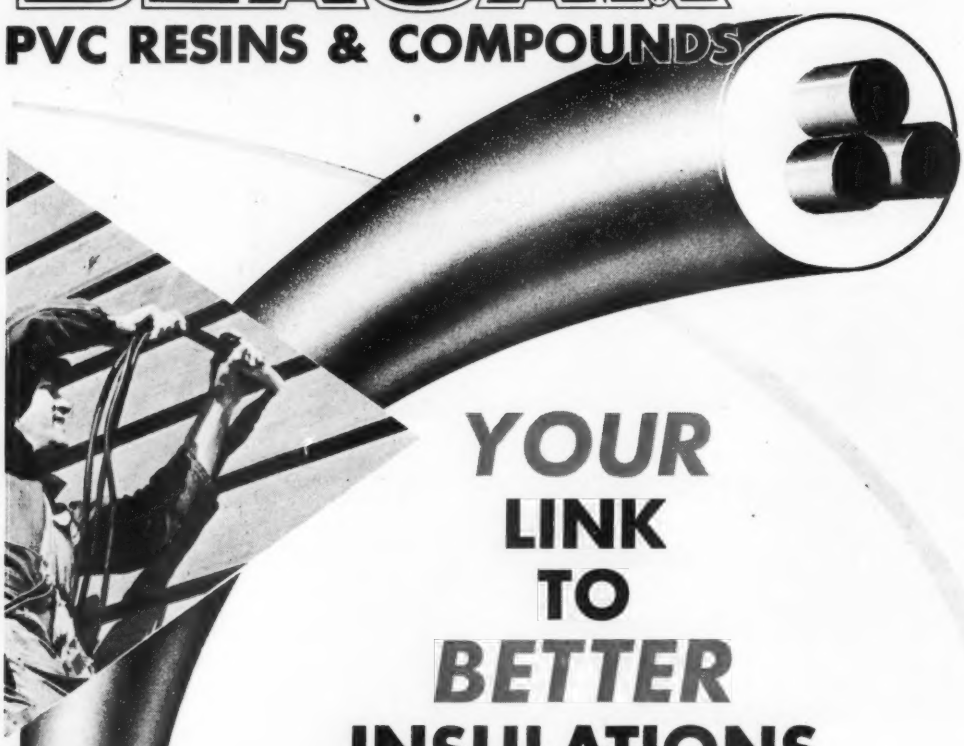
SHOWA

SHOWA MACHINE WORKS LTD.

No.16, Naka 3-chome, Mitezima, Nishi-Yodogawaku, OSAKA, JAPAN.

BLACAR®

PVC RESINS & COMPOUNDS



YOUR LINK TO BETTER INSULATIONS & JACKETS

Specialists in wire covering applications, Cary offers a full line of resins and compounds—UL approved—in a full range of molecular weights—"job-engineered" to meet the most rigid of quality standards for performance and uniformity.

For top performance, maximum processability, economy, you can't beat BLACAR resins and compounds.

Complete data, including summary of our recommended compounds, working samples —and truly personalized technical assistance are available on request.

CARY CHEMICALS INC.

CARY CHEMICALS INC.

P. O. BOX 1128, New Brunswick, New Jersey

Plants at East Brunswick, N.J., Flemington, N.J., and Woodside, L.I., N.Y.

VINYL RESINS — VINYL COPOLYMERS — VINYL COMPOUNDS — SPECIALTY WAXES — HIGH MELTING POINT SYNTHETIC WAXES

Perfect Balance — is the answer to better wire annealing

Heat balance—that's the answer whether you are annealing ferrous or non-ferrous wire. Lee Wilson's exclusive high convection furnace design eliminates hot and cold spots — assures balanced temperatures throughout the entire furnace. This means that every coil of wire or rod in the charge, whether it's at the top, middle or bottom of the spiders, gets the same amount of heat applied to the coil surfaces. Every coil comes from the furnace with exactly the same annealing treatment. This is one of the big reasons why more wire and rod are annealed in Wilson furnaces than in all others combined!

Lee Wilson* ENGINEERING COMPANY, INC.
20005 LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES

COLD-HEAD THESE AT *450* PER MINUTE

National High Speed Headers are capable of producing a wide variety of odd shapes like the above, as well as conventional fastener blanks.

Screw blanks stand perfectly erect. Such accuracy of product begins with a square, clean cutoff blank.

If you operate Headers, or use metal parts in quantity, here is good news.

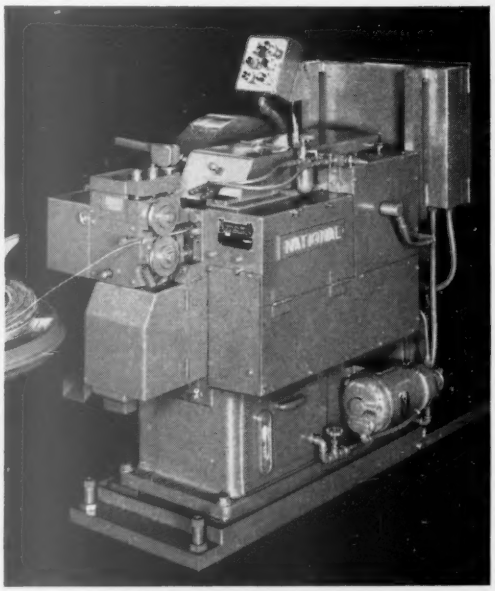
The National High Speed Cold Header is the exciting new breakthrough in producing metal parts!

Witness production runs of difficult-to-make parts. Observe the many advanced features in machines and tooling, as well as new cold-heading techniques now proved in everyday production.

Start now toward the benefits of sustained production at the highest *safe* speeds ever achieved. Be among the forward-looking header plants installing Nationals these days.

We offer you (1) A precision, hand-crafted machine, (2) Sound engineering assistance, and (3) Our experience in helping you flow metal.

ON NATIONAL 1/8" HIGH SPEED HEADERS!



1/8" High Speed Double Stroke Solid Die Cold Header: 450 accurate pieces per minute

3/16" High Speed Double-Stroke Solid-Die Cold Header: 350 accurate pieces per minute

Not just speed alone, but speed *plus...*

- Accuracy of Product
- Rigidity—Good Tool Life
- Holds Adjustment Well
- Lower Maintenance
- Fewer and Simple Adjustments
- Can Handle Many Jobs

We welcome you to Tiffin for actual demonstrations and a thorough study of your cold heading requirements.

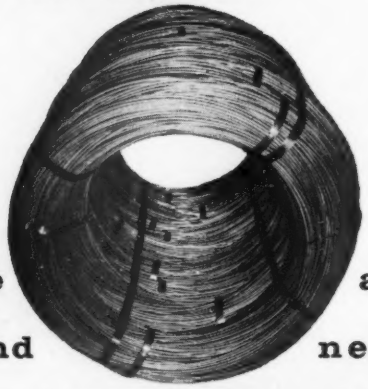
Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

HARTFORD DETROIT CHICAGO

MARATHON STEEL WIRE



For all specialized steel wire applications, particularly for rollers, balls and needles in anti-friction bearings, Marathon offers advantages derived from more than 150 years experience in specialty steels. Marathon assures best workability and uniform quality of steel wire of all types —alloy, high speed, stainless, tool, heat resistant—available straight or in coils. Specify Marathon, too, for high quality forged alloy steel rolls for flat cold rolling. Contact us and expect immediate attention to all inquiries and individual problems.

MARATHON

SPECIALTY STEELS, INCORPORATED

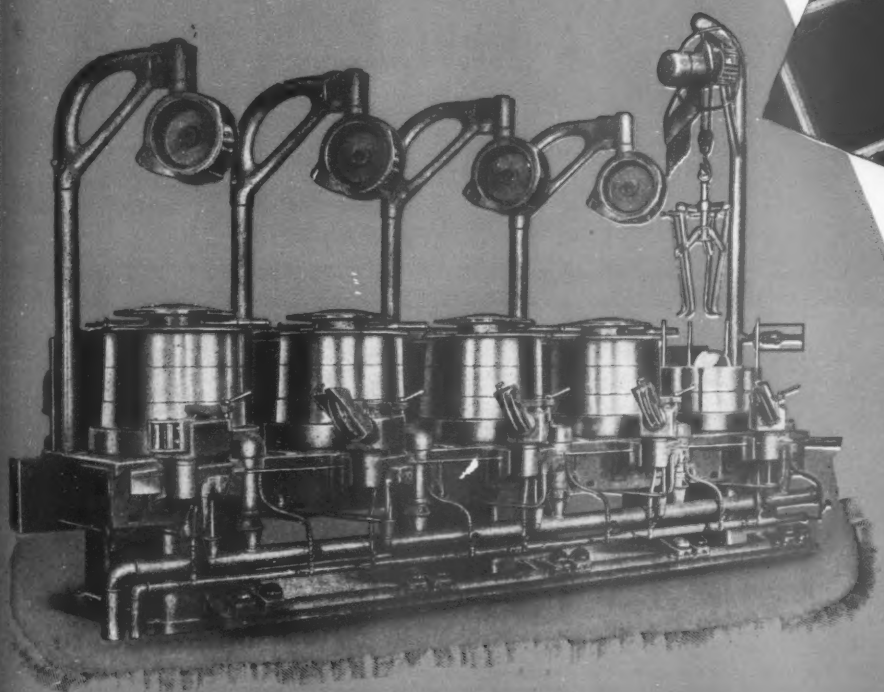
A Division of Deutsche Edelstahlwerke A. G., Krefeld, West Germany DEW 375 Park Avenue, New York 22, N. Y.

HERBORN

Non-Slip
Continuous

Wire Drawing Machines

For Low Carbon and
High Carbon Steel Wire



Please send your inquiries to

MASCHINENFABRIK HERBORN BERKENHOFF & DREBES A.-G. **HERBORN/DILLKREIS** GERMANY

HERBORN MACHINERY CORPORATION, 61 Hudson Street HACKENSACK, N. J.

THE BEELINE WIRE

A BEELINE DG-5 for manufacturing Pre-stressed Concrete Wire
up to .276" finishing size.

DRAWING MACHINE

WORLD WIDE

PRECISION WITH RUGGEDNESS

MORGÅRDSHAMMAR

MORGARDSHAMMARS MEK VERKSTADS AB • MORGARDSHAMMAR • SWEDEN

CABLE: Morgardshammar, Ludvika
Telephone: 0240-71100

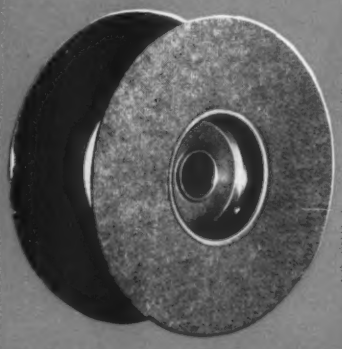
U.S. OFFICE **MH. MACHINES**
19002 LOMOND BLVD.
CLEVELAND 22, OHIO
TELEPHONE: WYoming 1-5830

HUBBARD HAS IT

If it's a spool or reel,
HUBBARD makes it.

EVERY TYPE:
Wood - Steel - Plywood
Masonite - Cardboard
Aluminum

HUBBARD is headquarters for any reel or spool requirement.

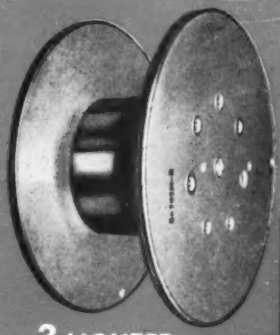


Reel with a masonite flange and cardboard hub assembled with steel end washers for domestic and export shipment of wire, tape, braid or other materials.

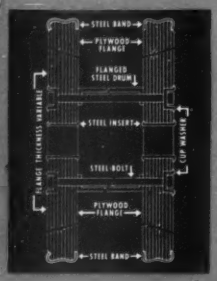
Heavy Duty Precision Brazed Steel Spool for drawing and processing of wire. Strongly and accurately made for long service.

Non-Returnable Magnet Wire Shipping Reels designed for high-speed wire take-off. Light in weight, low in cost, high in impact and tensile strength. Ideal for palletized shipments.

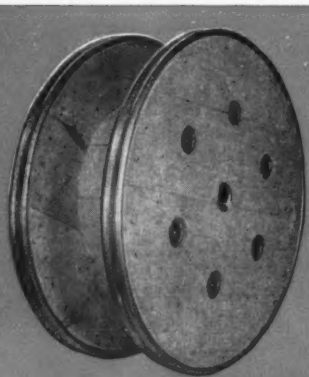
PLYWOOD MARRIES STEEL



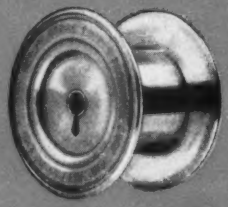
FOR BETTER SHOP REELS
RESULTING IN
1 GREATER IMPACT STRENGTH
2 LOWER MAINTENANCE COSTS
3 LIGHTER WEIGHT FOR EASIER HANDLING
4 ABILITY TO WITHSTAND SUBMERGENCE IN WATER
5 WIDE RANGE OF SIZES



HUBBARD SPOOLS & REELS are made in a modern plant with every facility for the manufacture of standard and special types of highest quality at the lowest possible cost.



Top quality wood reels armored with cadmium steel for maximum strength and long service.



Aluminum Reels designed for customers' appeal. Heads are strong. All welded construction. Smooth surfaces. Tare weight uniform. Ideal for bulk shipping.

Reel with plywood flange and galvanized steel hub assembled with tubular rivets and special washers for heavier loads.

HUBBARD SPOOL DIVISION
The American Pulley Company GARRETT, INDIANA
TELEPHONE: GARRETT 840

The Wire Outlook

The signs all point to a continuing good year. Operating inventories are being built up to replace depleted stocks in most lines — not just in steel. The consuming public is buying freely, employment is rising, businesses are being expanded, incomes are rising, and construction is at a high level, with no diminution in prospect.

While automobile deliveries have not been as high as anticipated, it is too early at this season to say that they will not pick up when the rigors of winter begin to abate. Sales are, however, considerably ahead of 1959. Consumers seem to be inclined to spend their added income, which in the last four years has increased by 40 billion dollars. The trend is toward larger expenditures for food, clothing, homes and education, with less for the larger cars and the more costly household equipment. Compact car sales are increasing, although the "big three" still believe that the major demand will prove to be for the larger models.

One of the interesting developments of the times is the trend toward the leasing of machinery and equipment. This is being done by an increasingly large number of manufacturers and some companies have been organized to buy machinery and lease them to manufacturing enterprises. While this may be more costly over a long period, it is proving popular since it avoids the necessity for large initial capital outlays.

The stock market's vascillation of late has raised some doubts as to the fundamental soundness of business, but the fact is that security prices have been far out of line with corporate earnings and the trend toward lower prices reflects nothing more than adjustment to a reasonable relationship of prices to dividends. Corrections may continue through this year and into next.

The electrical manufacturing industry anticipates a good year, predictions being that there will be an overall increase of 11 percent to a total of $23 billion this year. The outlook for insulating materials is a gain of 27 percent. The electric wire and cable producers anticipate a rise of 10 percent, to a total of about $1.6 billion in factory shipments.

Merchant wire product sales are picking up after the winter doldrums. Except for the West Coast, where imports of wire mesh and nails are severely cutting into domestic production, merchant wire sales east of the Mississippi are on a two month delivery basis. Wire rods and manufacturers' wire deliveries are somewhat longer, although the pressure for wire deliveries is not as great as a month ago. Automotive wire sales continue strong.

Brass mill producers, another area seriously affected by imported mill products, are reported to be meeting the situation by drastic reductions of prices, in some cases below those of the incoming products.

Playing politics appears to be the all-absorbing interest of most of our solons in Washington, considerably stepped up by the coming elections. The efforts to achieve economy in government are very likely to be nullified by these political considerations. Only an aroused public demand for economy can have any effect, but it is hardly to be expected that the voters will put sufficient pressure on their representatives to bring about any change.

The third quarter of the year is the only one that gives promise of being quiet. While business is good, it generally is felt to be sound and completely lacking in boom characteristics.

Edmund D. Nichols
EDITOR

From Steelskin® REG U.S. TRADE MARK Research

#357

"STEELSKIN" 357 is a result of many years of research.

"STEELSKIN" 357 is a powder which involves new and different raw materials in its manufacture.

"STEELSKIN" 357 is outstanding for drawing rope wire.

"STEELSKIN" 357 is superior for drawing tire bead wire.

"STEELSKIN" 357 is being acclaimed for its phenomenal performance.

"STEELSKIN" 357 is new — inquire about it — request a sample — you'll get exceptional results and you'll agree:

"STEELSKIN" 357 is tops!

Constant research and continued testing in the field have contributed to "STEELSKIN" 357's top performance. Users of "STEELSKIN" 357 have reported improved die life, greater uniformity and better quality in the wire they produce.

"STEELSKIN" can always be relied on for uniform composition,

Steelskin® REG U.S. TRADE MARK

METAL WORKING LUBRICANTS

R. H. MILLER

COMPANY, INC., Homer, N. Y.

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 35 MARCH, 1960 NO. 3

An Analysis of Extrusion Screws

By William J. Owens, Jr.
Engineer — Manufacturing Standards
Wire and Cable Department
General Electric Company
Bridgeport, Connecticut

The design of extrusion screws is one on which ideas vary and, of course, one design is not suited to all materials to be extruded. However, the mathematics of design propounded by the author, tend to reduce the empirical elements in designing practicable screws.

In the design of an extrusion machine the extrusion screw more than any other element controls the efficiency and the quality and quantity of output of the unit.

* * *

For clarification, it is well to establish the definition of an extruder screw, particularly from the standpoint of what it is intended to accomplish.

* * *

For our discussion, an extruder screw is defined as a cylindrically shaped extrusion machine part fitting with small clearance inside the "cylinder" of an extruding machine and having external helical flights. The screw, when rotated upon its axis causes the transfer of extrudable material through the "cylinder" from the feed port to the extrusion head. It serves as required and if so designed, the additional purposes of plasticizing, melting, warming or blending this material during the process of transfer.

* * *

Of foremost importance in the analysis of extruder screws is an establishment of nomenclature and definitions pertaining to the physical characteristics of these elements.

* * *

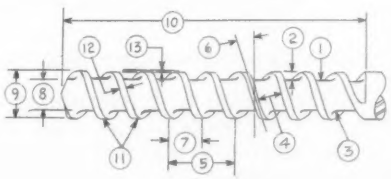


Plate I
EXTRUDER SCREW

In view of this, the following outline of dimensional characteristics (refer to Plate I) will serve as a standard nomenclature for the subsequent discussion.

1. **Flight (∧ = Type of Screw — No. of Flights)**
   The flight is the helical channel of the extruder screw through which the material is conveyed.
2. **Flight Depth (d)**
   The flight depth is the distance from the crest of the thread to the root of the extruder screw taken on a line perpendicular to the center line of the screw, and midway between the faces of adjacent threads and expressed in inches.
3. **Flight Fillet (radius) (r)**
   The flight fillet radius is the radius of the blended face at the junction of the thread and the root of the thread and expressed in inches.
4. **Flight Width (w)**
   The flight width is the distance from the leading face of one thread and the following face of the adjacent thread taken at right angles to the thread faces and expressed in inches.
5. **Lead (l)**
   The lead is the distance between the center points on the crests of two successive turns of a single thread measured parallel to the screw center line and expressed in inches.
   (In the case of multiple flight screws, the lead is measured on the basis of one of the flight threads and not on the basis of successive crests).
6. **Lead Angle (θ)**
   The lead angle is the angle included between the thread center line and a line perpendicular to the extruder screw center line and expressed in degrees.
7. **Pitch (p)**
   The pitch is the distance between the center points on the crests of two successive threads measured parallel to the screw center line and expressed in inches. (In the case of single flight screws, the lead and the pitch are equivalent terms).
8. **Root Diameter (D_R)**
   The root diameter is the diameter of the screw at the minor dimension of any flight of the screw, and midway between the faces of adjacent threads expressed in inches.
9. **Screw Diameter (D)**
   The screw diameter is the overall or major diameter of the screw taken to the top of the thread crest and expressed in inches.
10. **Screw Length (L)**
    The screw length is the total length

of the flighted section of the screw taken parallel to the screw center line and expressed in inches.

11. Thread
The thread is the helical ridge spacing the flights of the extruder screw.

12. Thread Crest Width (t)
The thread crest width is the actual thickness of the thread taken at a point farthest from the screw center line and expressed in inches.

13. Screw Clearance (σ)
The screw clearance is the axial clearance between the thread crests of the extrusion screw and the inner shell of the extruding cylinder. It is expressed in inches.

* * *

In addition to these directly measurable dimensional characteristics, the following terms are used in the practical calculations of extruder screw characteristics:

14. Area of Flight (A)
The area of flight is the cross section area of the screw flight taken at any point and in a plane perpendicular to adjacent thread faces and expressed in square inches.

15. Volume per Flight (V)
The volume per flight is the total volume held in one turn of flight in an extrusion screw expressed in cubic inches.

16. L/D Ratio (Nominal)
The nominal L/D ratio is the ratio of the length of the extrusion screw flight section taken parallel to the screw center line to the overall diameter (major) expressed as a ratio X:1.

17. L/D Ratio (Effective)
The effective L/D ratio is the ratio of the length of the extrusion screw flight section less the width of the feed port taken parallel to the screw center line to the overall diameter (major) expressed as a ratio X:1.

18. Depth Ratio (R)
The depth ratio in screws of constant pitch is the ratio of the depth of the screw at a point immediately beyond the feed port and the depth of the screw at the extrusion end expressed as a ratio Y:1.

19. Compression Ratio (C)
The compression ratio is the ratio of the volume of one turn of the extrusion screw immediately beyond the port end and the volume of one turn of the screw at the extrusion end expressed as a ratio Z:1.

20. Theoretical Capacity (W_T)
The theoretical capacity of an extrusion screw is the output of the screw based upon the volume of the final flight or flights (in a multiple-flight screw), the RPM of the screw, and the density of the extruded compound and expressed in lbs./hr.

21. Actual Capacity (W_A)
Actual capacity of an extrusion screw is the measured output of an extrusion screw under any conditions and expressed in lbs./hr.

22. Rate of Shear in an Extrusion Screw Channel (S)
The rate of shear in an extrusion screw channel is the mean velocity of the screw with respect to the extruder cylinder divided by the depth of the flight. Dimensionally it is expressed in terms of seconds^{-1}.

23. Revolutions per Minute of Screw (N)
The revolutions per minute of an extrusion screw is the rotational speed of the screw expressed in RPM.

24. Screw Efficiency (E)
Screw efficiency is the ratio of the actual capacity of an extrusion screw to the theoretical capacity expressed in percent value.

25. Pitch Diameter (Mean Diameter) (D_P)
The pitch diameter of an extrusion screw is the diameter of the screw taken across points one half of the flight depth and midway between the faces of adjacent threads and expressed in inches.

26. Specific Gravity of Extrudable Material (s)
Specific gravity of material under consideration for extrusion.

To modify these values for specific sections of the screw where necessary and applicable a sub-legend of 1 is used for values at feed port, of 2 for values at a point immediately beyond the feed port and of 3 for values at the extrusion end (such as V_1, V_2, V_3 or W_1, W_2, W_3).

Extrusion Screw Formulas

The following formulas are expressions of relationships used in the calculation of extruder screw characteristics.

* * *

They are used in the calculation of characteristics of existing screws and in the design of proposed screws.

Pitch Diameter of Extrusion Screw (inches)

(1) $D_p = \frac{D + D_R}{2}$

at any point on screw when finding Area or Volume of flight. D_p is calculated at the feed port, immediately beyond feed port and at extrusion end of the flight.

Depth of Flight (inches)

(2) $d = \frac{D - D_R}{2}$

at any point on screw when finding Area or volume of flight d is calculated at the feed port, immediately beyond feed port and at extrustion end of flight.

Width of flight (inches)

For practical calculation width of flight is taken on a line parallel to the center line of the screw.

For single flights (3) $w = 1 - t$

For double flights (4) $w = \frac{1 - 2t}{2}$

For quad flights (5) $w = \frac{1 - 4t}{4}$

L/D Ratio (Nominal)

Express as the ratio (6) L/D : 1

L/D Ratio (Effective)

Calculate (7) $L_E = L$ — (width of feed port)

Express as the ratio (8) L_E/D : 1

Lead Angle (degrees)

(9) $\theta = \tan^{-1} \frac{l}{\pi D_p}$

Area of Flight (square inches)

(11) $A = (wd - .43r^2)$ *at any point on screw

Volume per Flight (cubic inches)

(12) $V = \pi D_P (wd - .43r^2)$ *at any point on screw

Depth Ratio

Calculate d_2 (depth of screw at a point immediately beyond feed port)
d_3 (depth of screw at extrusion end)

(13) $R = d_2/d_3 : 1$

Compression Ratio

Calculate V_2 (volume per screw turn immediately beyond feed port)*
V_3 (volume per screw turn at extrusion end)*

(14) $C = V_2/V_3 : 1$

Theoretical Capacity (lbs./hr.)

(15) $W_T = 2.17 (V_3Ns)$*

Screw Efficiency (Percent)

(16) $E = \frac{W_A}{W_T} \times 100$

* For multiple flight screws or screw section, the area or volume of each flight is calculated. The true area or volume per screw turn is determined by multiplying the value obtained by two for a double flight screw and by four for a quadruple flight screw. (i.e. multiply by $\wedge$)

Rate of Shear in Extrusion Screw Channel (seconds $^{-1}$)

(17) $S = \frac{\pi D_P N}{60 d}$

Estimate of Flight Depth

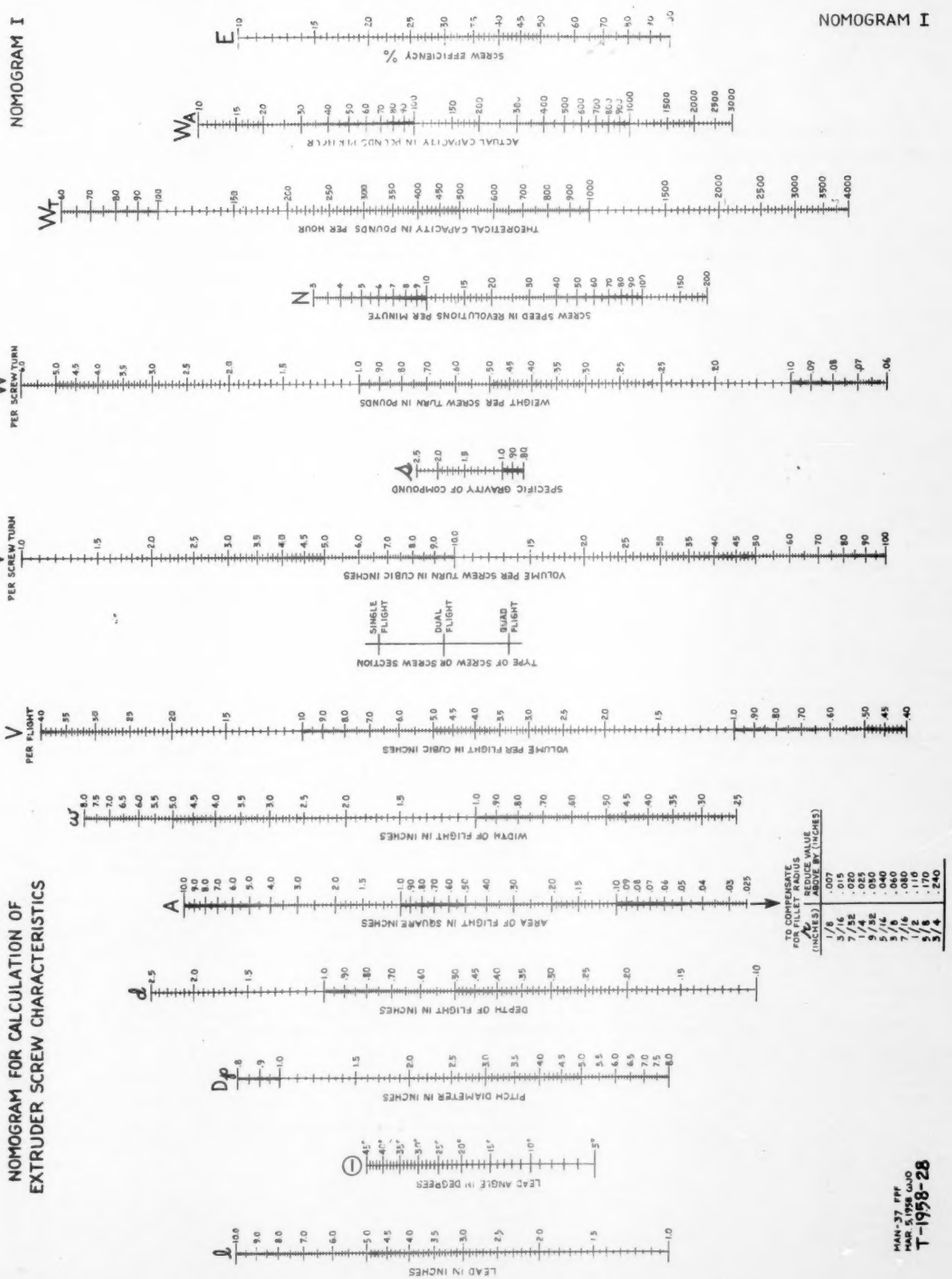
By combining formulas (12), (15) and (17) a formula is obtained which will estimate the depth of flight to obtain a specific shear rate and capacity.

(18) $d^2 = \frac{.0077 W_T}{Sw \wedge s}$

Use of Nomogram I for Calculation of Screw Characteristic Data

1. To determine Lead Angle (θ)
For each end of the screw lay a straight edge between the scale values of D_{P1} and l_1, or D_{P3} and l_3. Read θ_1 or θ_3 where straight edge crosses scale θ

2. To determine Area of Flight (A_1)


NOMOGRAM I
NOMOGRAM I
NOMOGRAM FOR CALCULATION OF EXTRUDER SCREW CHARACTERISTICS
E
SCREW EFFICIENCY %
WA
ACTUAL CAPACITY IN POUNDS PER HOUR
Wt
THEORETICAL CAPACITY IN POUNDS PER HOUR
N
SCREW SPEED IN REVOLUTIONS PER MINUTE
W
PER SCREW TURN
WEIGHT PER SCREW TURN IN POUNDS
SPECIFIC GRAVITY OF COMPOUND
V
PER SCREW TURN
VOLUME PER SCREW TURN IN CUBIC INCHES
TYPE OF SCREW OR SCREW SECTION
SINGLE FLIGHT
DUAL FLIGHT
QUAD FLIGHT
V
PER FLIGHT
VOLUME PER FLIGHT IN CUBIC INCHES
w
WIDTH OF FLIGHT IN INCHES
A
AREA OF FLIGHT IN SQUARE INCHES
TO COMPENSATE FOR FILLET RADIUS r (INCHES) | REDUCE VALUE ABOVE BY (INCHES)
1/8 | .007
3/16 | .015
7/32 | .020
1/4 | .025
9/32 | .030
5/16 | .040
3/8 | .060
7/16 | .080
1/2 | .110
5/8 | .170
3/4 | .240
d
DEPTH OF FLIGHT IN INCHES
Dp
PITCH DIAMETER IN INCHES
LEAD ANGLE IN DEGREES
l
LEAD IN INCHES
MAN-37 FPF
MAR 5 1958 WMD
T-1958-28

NOMOGRAM II
d
DEPTH OF FLIGHT IN INCHES
S
RATE OF SHEAR ~ SECONDS TO THE - 1
INDEX II
INDEX II
ω
WIDTH OF FLIGHT IN INCHES
BASED ON FORMULA:
$d^2 = \frac{.0077\ W_T}{S\omega\Delta\rho}$
INDEX I
INDEX I
V
TYPE OF SCREW SECTION - SCREW END
QUAD FLIGHT
DUAL FLIGHT
SINGLE FLIGHT
V_T
VOLUME OUTPUT IN CUBIC FEET PER HOUR
SPECIFIC GRAVITY OF COMPOUND
W_T
THEORETICAL CAPACITY IN POUNDS PER HOUR
W_A
ACTUAL CAPACITY IN POUNDS PER HOUR
E
SCREW EFFICIENCY %
NOMOGRAM FOR CALCULATION OF EXTRUDER SCREW DESIGN
NOMOGRAM II
REV 6 RED. AUG 27, 1958
MAN-37 FPF
MAR 24, 1958 WJO
T-1958-35A

For feed end of screw lay a straight edge between the scale values of d_1 and w_1. Read A_1 where straight edge crosses scale A. Reduce value of A_1 by quantity designated on scale for r values for value r_1.

3. To determine Volume per Flight (V_1 per flight)

   For feed end of screw lay a straight edge between the scale value of A_1 (corrected for r_1) and the scale value of D_{P1}. Read Volume per Flight at feed end where straight edge crosses V (per flight) scale.

4. To determine Volume per Screw Turn (V_1 per screw turn).

   For feed end of screw lay a straight edge between the scale value of Volume per Flight and the type of screw flight at feed section. Read V_1 per screw turn for feed end where straight edge crosses that scale.

5. To determine Area of Flight (A_2), Volume per Flight (V_2 per flight) and Volume per screw turn (V_2 per screw turn). For the point on the screw immediately beyond the feed port use the Nomogram as outlined in 2, 3, and 4 except use values D_{p2}, d_2, w_2 and r_2 and read A_2, V_2 per flight and V_2 per screw turn.

6. To determine Area of Flight (A_3), Volume per Flight (V_3 per flight) and Volume per Screw Turn (V_3 per screw turn). For extrusion end of screw, use the Nomogram as outlined in 2, 3, and 4 except the values D_{p3}, d_3, w_3 and r_3 and read A_3, V_3 per flight and V_3 per screw turn.

7. To determine Compression Ratio (C) and the Depth Ratio (R) Calculate —

   $R = d_2/d_3 : 1$

   $$C = \frac{V_2 \text{ (per screw turn)}}{V_3 \text{ (per screw turn)}}$$

8. To determine Weight per Screw Turn (W screw turn)

   Lay a straight edge between V_3 per screw turn and s. Read W per screw turn where straight edge crosses this scale.

9. To determine Theoretical Output (W_T)

   Lay a straight edge between W per screw turn value and N value. Read W_T where straight edge crosses this scale.

10. To determine Screw Efficiency (E) Lay a straight edge between W_T value and W_A value. Read E where straight edge crosses this scale.

Factors in the Selection of an Extruder Screw

In the design of an extruder screw there is a fairly high degree of empirical information which must be used. This information can be gained through experimentation, judgment and past experience.

* * *

In such design we just must view these basic considerations for selection.

1. Nature and type of the compound to be extruded.
2. Size and shape of extrusion.
3. Condition and form of material.
4. Temperature of stock delivered to the screw.
5. Temperature of stock required in head and at extrusion.
6. Length to diameter ratio (L/D ratio).
7. Type and shape of extrusion head.
8. Required head pressure.

* * *

Next are the more specific considerations, some of which are defined accurately and others which require the application of good judgment. Included in these are the following:

1. *L/D Ratio* of the extruder screw depends in large part on two factors:
   a. High L/D ratio 10:1 or more is needed for highly fluid materials or materials where slip is high, such as silicone.
   b. Low L/D ratio 5:1 or less increases the need for higher compression ratio.
2. *Lead* of the extruder screw should be based on certain factors:
   a. Lead should be more than the width of the feed strip on thermosetting materials, but not more than about 50% greater.
   b. Lead should be approximately equal to the feed port width on thermoplastic screws.
   c. Lead should be nearly equal to the diameter of the screw in all cases.
3. *Lead angle* of the extruder screw should be as low as possible, since this provides less variation in flow due to die restrictions. Under 25° is good, under 20° excellent.
4. *Screw Efficiency* can be predicted with reasonable accuracy based on known results. The more fluid a material is, the lower its anticipated screw efficiency will be.
5. *Shear in extrusion screw channel* will remain constant as an optimum regardless of other factors. It may be used as a means of estimating optimum screw depth and RPM based on other screw dimensions.
6. *Variable lead or pitch* should be avoided in screw design if possible (high compression ratios sometimes create the need) since it makes the screw expensive to fabricate. Variable root or depth screws can provide the needed compression ratio in most instances.
7. *Metering Sections* of 10 to 15% of screw length at the extrusion end or for the width of the feed port at the feed end improve operation in certain instances.
   a. They stabilize the flow of fluid, plastic or slippery compound when used on extrusion end.
   b. They improve thermal conditions on stiff or rigid compounds when used on the extrusion end.
   c. They improve feed of compounds when used on feed end.
8. *Screw Clearance to Bore of Cylinder Liner*

Extruder Size Inches	Clearance Minimum	Clearance Maximum
2½"	.007"	.030"
3¼"	.008"	.033"
3½"	.010"	.035"
4½"	.010"	.035"
6"	.012"	.055"
8"	.013"	.060"

Use of Nomograms I and II for Design of Extruder Screws

With the considerations discussed a mathematical approach may be made to the actual design of a screw using Nomograms I and II as aids in the calculation. Procedure is as follows:

1. Calculate w using the appropriate formula (3), (4) or (5).
2. Using Nomogram II
   a. Lay a straight edge between E and W_A (Max.) Read W_T (Max.) where straight edge crosses W_T scale.
   b. Pivot on value W_T (Max.) and s read V_T (Max.) where straight edge crosses V_T scale.
   c. Lay a straight edge between V_T (Max.) and type of screw at extrusion end ∧ and find pivot point in Index I where straight edge crosses.
   d. Pivot straight edge on Index I and pass through value w_3 at extrusion end and find pivot point on Index II where straight edge crosses.
   e. Pivot straight edge on Index II and pass through optimum value of S (established by experience or experimentation) and read d_3 at extrusion end where straight edge crosses.
   f. Determine D_{P3} by formula — (19) $D_P = D - d$
3. Using Nomogram I
   a. Lay a straight edge between E and W_A (Max.). Read W_T (Max.) where straight edge crosses W_T. Mark point.
   b. Lay a straight edge between d_3 and w_3 (at extrusion end). Pivot on scale A through value of D_{P3} read V_3 (per flight).
   c. Pivot on V_3 (per flight) scale through type of screw, read V_3 (per screw turn) where straight edge crosses that line.
   d. Pivot on V_3 (per screw turn) scale through value of s read W_3 (per screw turn) where straight edge crosses that line.
   e. Pivot on W_3 (per screw turn) scale to value determined in 3a. for W_T. Read optimum N value where straight edge crosses that line.
4. Using Nomogram I
   a. Calculate V_2 (per flight) at a point immediately beyond the feed port by formula:

   $$C = \frac{V_2 \text{ per flight (at a point immediately beyond feed port)}}{V_3 \text{ per flight (at extrusion end)}}$$

(*Please turn to page* 391)

Again, ACROMETAL

slashes

costs

YOU CAN NOW

LAYER-WIND

automatically

...LIKE THREAD ON A SPOOL!

SQUARE OR RECTANGULAR WIRE

Packaging square or rectangular wire has always been a slow process and a problem—requiring manual supervision.

ACROMETAL'S new "Layer Winder" has licked this problem for good. With its special tension guides, this machine handles flat wire easier than most take-up machines handle round wire. And at speeds up to 1,000 feet per minute!

No more handguiding—no more stops and starts—no more creeping slow speed reeling.

Production models of this machine are already setting new records in several mills around the country. It has been known to turn out as much work as 4 men using traditional methods. Write us or call us for details.

"Designers and manufacturers of everything you need for packaging wire."

ACROMETAL PRODUCTS, INC.

616 North 5th Street, Minneapolis 1, Minnesota

A Pre-Production Test for Acid Inhibitors

by Rudolf H. Hertzog
Metallurgical Engineer
Steel Wire Mills Division
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation
Trenton, New Jersey

In this article the author comments on tests of new materials in general and in particular describes the method by which his company tests new inhibitors to determine their efficiency.

New industrial products are being placed on the market in a continuous stream. Since the general basis of sale of such products to consuming industries is reduction of cost or improved quality, it follows that evaluation of new products is important. In order properly to evaluate new products, both quality-wise and cost-wise, it is often necessary to place them into a regular production line or operation. Production trials of new products invariably cause some disruptions in production operations, but without such trials industrial progress would be handicapped. Resistance to change — if everything is in order — is generally considered a natural human attribute, but it is more reasonable to assume that resistance to change is influenced more by the picture of production disruptions rather than indifference to progress.

* * *

There certainly is no intent to imply that one resists progress if he does not try everything new under the sun. Too often, what is claimed to be new is really something old with a new name. Again, too often, something that is new is produced by several different companies at the same time, given different names with each claiming that his own is distinctly different and better than the others. Care must be taken that a mill does not fall into the position of being a trial horse for mill suppliers products rather than being a producer of its own product. It follows that a responsible sense of distinction is required between what is old and what is new in order to maintain good positive direction.

* * *

A mill trial of a new product can be relatively easy or difficult depending on the operation involved. Where a mill unit depends on small batch application of a product, trial is relatively easy. A case in point is a dry wire drawing lubricant. While time and effort are always involved, the risk in damage to quality of the product being drawn is small because trouble in this type of test is quickly spotted, the operation can be stopped instantly and relatively little time or loss of production is involved in going back to normal procedure.

* * *

Examples of difficult applications are trials of wet drawing lubricants where many machines are fed from a large reservoir and trials of inhibitors in pickling operations where tank sizes run into thousands of gallons. While the start of a test is easily organized when new batches of lubricant or acids are made-up, sudden stopping of such operations, on account of trouble with the new material being tested, will create an appreciable loss in materials and production. Hours rather than minutes are necessary to get back to normal procedure.

* * *

Generally, most mills will establish applicable laboratory procedures for trial of new products which come under the category of being relatively difficult to place in normal production line. Suppliers of new products view laboratory trials with mixed emotions. If such a test is in their favor it is a fine test but a reverse result always brings forth the comment, "Laboratory tests are not a positive answer, you have to try it in a production line".

* * *

John A. Roebling's Sons Division of The Colorado Fuel & Iron Corporation has been using a sulphuric acid inhibitor test for many years and this test has proven to be reliable in relation to actual production results. The test is simple and is based on a loss of weight comparison between standard samples immersed in inhibited acid and uninhibited acid. The test can be used to compare inhibitive properties of new products or to maintain control of inhibitor in operating acids. Inhibitive efficiency is defined as:

$$\text{*Inhibitive Efficiency} = \frac{Wu - Wi}{Wu} \times 100$$

Wu—Weight loss in uninhibited acid
Wi—Weight loss in inhibited acid
***—Does not consider cost**

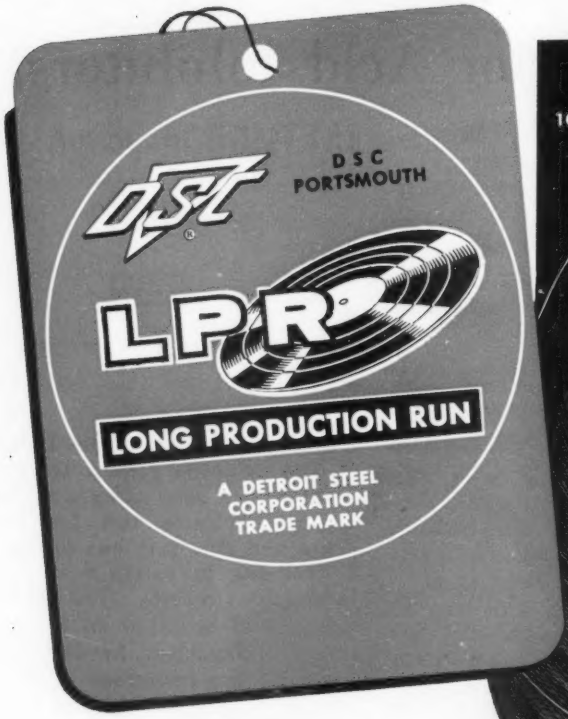
* * *

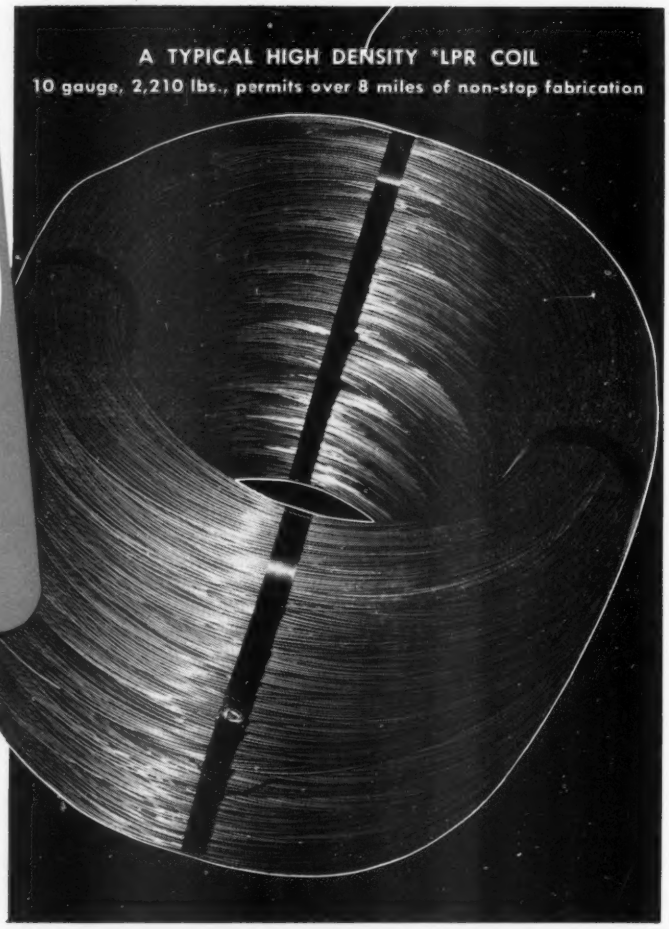
The essential material for this test, aside from the acid and inhibitor, is the steel sample on which the test is made. The chemical analysis of the steel sample should be representative of the average material used in the mill and a sufficient amount of sample should be on hand to cover a considerable period of time. For our test, we use carbon steel strip 1½" wide by .010" thick. A small coil of this material, properly protected, will last for many years. When a new coil has to be prepared, correlating tests should be made against the previous coil.

* * *

A constant temperature has to be held for this test. We have adopted 206°F to 208°F because of the ease with which it can be held using a boiling water jacket. A 500 ml Phillips beaker immersed in a water jacket consisting of a

(*Please turn to page* 385)





This LPR Tag

on your Brite Wire coils means greater efficiency in your fabricating operations —at no added cost

Typical *LPR Savings as reported by Users (See Note)

- **Downtime frequency due to coil changes and setup adjustments cut as much as 95%.**
- **Cumulative coil-end scrap trimmed to the bone.**
- **Man-hour costs slashed (20% and more is common).**
- **Material handling time and expense substantially reduced. Unloading time alone cut from 16% to 50%.**
- **High density, self-supporting coils release 15% to 20% of storage space for more productive uses, improve inventory management.**
- **Machine productivity increased . . . for example, 1 man now operates 4 machines against 3, previously.**
- **"Returnable-carrier" problem and small storage racks eliminated.**

NOTE—Savings and improvements cited were experienced following switch from traditional mill weight bundles (150 pounds to 400 pounds).

Look Into *LPR's Yourself

Our Portsmouth Division pioneered the development of *LPR coils in the early 1950's. PURPOSE—to improve efficiency and reduce costs in our own Welded Wire Fabric operations.

We'll gladly share our experience with you if you're a Brite Wire fabricator. We also invite you to visit our Portsmouth Mill to see for yourself how *LPR's perform. For an appointment or for further information on any DSC products, please call your nearest DSC Customer "Rep" or write Detroit Steel Corporation Box 4308, Detroit 9, Michigan.

CUSTOMER "REP" OFFICES

Detroit, Grand Rapids, Jackson, Mich.; Cleveland, Cincinnati, Columbus, Dayton, Toledo, Ohio; Hamden (New Haven) Conn.; Worcester, Mass.; New York City, Rochester, N. Y.; Chicago, Ill.; Milwaukee, Wisc.; Indianapolis, Ind.; St. Louis, Mo.; Charlotte, N. C.; Louisville, Ky.; Houston, Texas.

*A DSC TRADE MARK

COPYRIGHT DETROIT STEEL CORPORATION 1960

Performance Proved DSC®

DETROIT STEEL

Flat Rolled and Wire Products

Wire Rope Practices at The Scripps Institution of Oceanography

by Maxwell Silverman and Jeffery D. Frautschy
Scripps Institution of Oceanography
University of California
La Jolla, California

This paper was presented at the Joint Meeting, California Section, of the Society of Naval Architects and Marine Engineers, Carmel, Cal., in October, 1959, and is published through the courtesy of the authors and the Society.

The safe, efficient and economical use of wire rope has long been a subject of great concern in industry, however little has been accomplished towards understanding the operating characteristics of wire rope as an oceanographic tool, particularly its stress, elongation, and rotation parameters at very great lengths.

* * *

An attempt, which will be discussed here, has been made at the Scripps Institution to formulate a practical attitude covering the use of wire rope which is based on accepted industrial techniques, modified to meet the peculiar limitations of conducting scientific work at sea. Since 1952 when it became common at Scripps to conduct several major expeditions each year, approximately one million feet of hydrographic wire and dredge wire costing over $100,000 have been purchased. In addition to this procurement are large quantities of bathythermograph wire, strand for buoy operations and rope for shipboard rigging.

* * *

An average of four to six 25,000 foot reels of 3/16 inch diameter hydrographic wire rope and two to three reels of 3/8 inch, 1/2" or tapered dredge wire rope are contracted for each year. Also, factory rehabilitation of "cranky" or wild dredge rope is undertaken at periodic intervals. Specification standards have been created and limited testing conducted.

* * *

The Scripps Institution operates a fleet of eight research vessels ranging in size from the 1900 deadweight ton MV SNATCH, currently being converted from its former status as a "mothballed" navy salvage vessel to a 76-ton in-shore survey boat, the T-441. These vessels routinely range the entire Pacific area. Trips vary from local day trips and repeated year round three-week hydrographic operations off the California coast to five and six month cruises. An attempt is made to schedule each vessel for a maximum of 240 days per year at sea, but this number has occasionally been as high as 290 days. The annual cumulative track of all vessels is approximately 200,000 miles.

* * *

Major expeditions, numbering over fifteen in the last six years, generally encompass studies in several scientific disciplines rather than being restricted to single purpose investigations. Shorter one and two month cruises are usually devoted to individual studies in Geophysics, Geology, Chemistry or Biology. It is believed that these programs may expand twofold by 1965.

* * *

Laboratories aboard Scripps vessels are designed to be flexible in order that various groups of scientists may readily fit equipment peculiar to their individual fields. Vessel operating schedules are also flexible so that investigators may utilize a ship to its fullest capabilities. Scripps crews are trained to assist in scientific operations and the vessels are considered extensions of the institution's shore based laboratories.

Applications at Sea

Generally, wire rope in oceanographic work must be utilized for several dissimilar applications. Operating conditions vary widely as to terminal loading and amounts of rope paid out. Equipment weighing more than 200 pounds is hoisted by heavy duty winches on cable of 3/8 inch diameter or greater; lighter gear is hoisted on so-called hydrographic wire of 3/16 inch diameter.

* * *

Wire applications include hydrographic or Nansen bottle casts, both gravity and piston coring of bottom sediments, geothermal gradient measurements, bottom photography, rock and sediment dredging, biological sampling with nets, scoops and grabs, deep mooring using the taut wire technique, and lowering of acoustic and experimental arrays. Coring and dredging are the most strenuous operations in terms of rope abuse because of the large stresses developed on breaking free from the bottom. Light gravity coring is sometimes, of necessity, done with the same rope as are hydrographic casts during an individual cruise. In many instances this rope will be in an overstressed condition thereby endangering subsequent casts.

* * *

On the Scripps vessels, Spencer F. Baird and Horizon, two light winches are available to handle hydrographic wire and current practice is to use one for bottom sampling and the other for water sampling and small net towing. Wire is first put into service for water sampling and is retired to bottom sampling service. This is because a cast of Nansen bottles and associated thermometers may cost as much as $10,000, while bottom sampling equipment is relatively inexpensive. One of the winches is also used to install deep moorings. As an indication of use on a cruise, consider the Scripps Chinook expedition to the North

Pacific on the Baird in the summer of 1956. Twenty round trips to an average pay-out depth of 6,000 meters were made with the light coring winch, carrying each time a terminal dead load of 200 pounds and a wire weight of 1,000 pounds. Twelve deep Nansen casts were made on the other winch to an average depth of 5,000 meters. On a routine Scripps hydrographic cruise, around 150 Nansen stations will be occupied to a depth each of 1,200 meters. The bottom weight and bottle weights will be close to 200 pounds. On the Downwind Expedition of 1957-58, 180 lowerings to various depths were conducted from the Baird's hydrographic winch solely for gravity coring and bottom photography. The average life of a hydrographic rope at Scripps is about one year. During this time there would be perhaps four hydrographic cruises and two expedition-type cruises.

* * *

Heavier dredge ropes, even though their use is more severe have a longer life. These ropes have a greater reserve strength and are not so quickly overstressed. Their average life at Scripps varies from two to four years before retirement or failure.

Stresses

Rope stresses are tensile, torsional and compressional: tensile, as in dead or terminal loading, drag from the towing effects, acceleration, deceleration, impact or shock, as in hitting the bottom, pull-out on retrieving from the bottom, and rope weight loading; torsional as in bending over sheaves and drums, and in induced rotational stresses and compressional stresses in the case again of impact. Some of these stresses can be quite accurately computed, others such as rotational stresses, drag stresses, and impact stresses, can only be approximated.

* * *

It appears highly probable that in using hydrographic rope for coring at depths greater than 2,500 fathoms, the rope will be stressed almost to the yield point. The stresses in a deep Nansen cast will probably never go above half this amount. In piston coring with heavy dredge rope, the yield point may be barely reached, but in rock dredging it may be easily exceeded. The yield point, or elastic limit, of a rope is that point at which Hooke's Law is no longer followed and at which, for all practical purposes, the rope loses its elasticity. It varies from 50 to 65% of the breaking strength of the rope. Repeated stressing past the yield point has the effect of decreasing the breaking strength until eventually it closely approaches the yield point. In the mooring of a deep sea taut wire buoy, the yield point may almost be reached in the initial emplacement. This type of wire is never retrieved to be used a second time.

Types of Rope in Use

Because of the sometimes destructive conditions under which oceanographic ropes are used as well as the dissimilarity of these conditions, it is doubtful as to whether an all purpose rope could ever be constructed. There is a considerable range of wire rope characteristics contingent both on metallurgy and mode of fabrication. Resistance to corrosion, stress fatigue, abrasion and load induced rotation are all variables in addition to tensile strength, flexibility and ease of splicing and handling.

* * *

Bathythermograph wire, the smallest wire used, is approximately 3/32 inches in diameter, and is usually obtained from various government sources with a consequent variation in characteristics. Almost always it is 7 by 7 aircraft cord. It may be bright, galvanized, or stainless.

* * *

Strand for deep mooring operations is of the 1×7 construction and has been purchased in 0.123 inch and 0.200 inch diameters. Specifications call for the individual wires to be drawn to 272,000 psi. which in the case of the 0.123 inch strand, give a test breaking strength of 2,380 pounds. The length of lay equals ten diameters and the strand is furnished preformed, right lay, regular lay. This product has been furnished both with galvanized protection and in bright wire with either petrolatum lubricant or asphalt base marine lubricant. The 0.123 inch strand weighs 0.031 pounds per foot in air.

* * *

Hydrographic wire rope is normally 3/16 inch in diameter and is of the 3 x 19 Seale construction. Specifications call for the individual wires to be drawn to 260,000 psi. which is in the middle of the improved plow steel range of federal wire standards. Directly specifying draw strengths insures receiving a rope of optimum overall characteristics.

* * *

Test breaking strengths of 3/16" hydrographic wire have ranged up to 4,560 pounds. This rope is furnished preformed, right lay, regular lay. The nominal rope lay is ten times the diameter. Rope weight in air is 0.062 pounds per foot. Hydrographic ropes are furnished galvanized and have been procured both electrolytically coated and hot dip coated. The former process gives a softer coating, the latter causes a reduction of up to ten percent in breaking strength due to stress conditions at the zinc steel interface if galvanizing is done after the wires are drawn to final diameter. However the dip process gives a tougher coating. This strength reduction is not present in drawn galvanized wires. At the present time the evidence for superiority of either process is inconclusive.

* * *

Comparative tests on induced rotation under heavy load between the 3 x 19 construction, which was adopted in 1952, and the previously used 7 x 19 aircraft cord, show a considerably lesser tendency to unlay for the 3 x 19, and a rapid initial adjustment to a relatively stable condition insofar as rotation is concerned. The 7 x 19 construction exhibited continuing unlaying and elongation with each loading, ultimately resulting in failure of the center strand. In general two types of stretch are encountered in wire rope. Constructional stretch is due to the adjustment to each other of the wires and strands in the helical form of the rope. This is irrecoverable and will occur early in the life

of the rope if the rope is heavily loaded. Elastic stretch is due to the elastic properties of the metal and is recoverable below the elastic limit. The tendency to rotate and unlay is excessive under heavy load with certain constructions. The 3 x 19 construction, in addition to its excellent non-rotating properties, has been designed to resist extreme abusive conditions due to the absence of a core. Also the selection of the Seale construction of the individual strand provides a good balance in characteristics. The large outer wires resist abrasion, the small inner wires provide flexibility and the general construction is one of the most stable used in the wire industry.

* * *

Unfortunately three strand wire rope cannot be long spliced using conventional techniques. Repairs to damaged sections in the middle lengths of a spool can only be accomplished by means of patented fittings which increase the overall diameter of the rope at these points, thereby making it difficult to reeve this rope through sheaves.

* * *

Two types of dredge ropes are utilized at Scripps. Straight cables of 3/8" diameter and 1/2" diameter; and a step-tapered rope composed of individual segments in 1/16" increments from 3/8" to 3/4". The lengths in each diameter are from 3,000 to 7,000 feet and are selected to provide a proper weight to breaking strength balance.

* * *

The straight dredge cables are used on the vessels Horizon, Stranger and Paolina-T and on the auxiliary drum of the Spencer F. Baird. The 3/8" ropes are 25,000 feet in length and the 1/2 inch rope, only on the Horizon, is 22,000 feet long.

* * *

The tapered rope on the dredging winch of the Baird has at various times, operated at lengths of 27,000 to 39,950 feet. The latter length has a weight close to 15 tons. The construction of all ropes is presently 6 x 19 Seale with independent wire rope center (IWRC) and furnished preformed, right lay, regular lay and galvanized. Base marine lubricants are added tightly upon closing the rope at the factory. All wires are drawn to 260,000 psi. (improved plow steel). Length of lay is six to six and a half times the diameter.

* * *

The original tapered cable in 1952 had a 6 x 25 filler wire construction. This was a very flexible rope but the smaller diameter of the outer wires led to a more rapid breakdown under corrosion and fatigue. This cable was machine tapered in the factory in one continuous length of 30,000 feet. Subsequent tapered cables have been constructed by long splicing the various lengths of the individual diameters together in their proper positions. This technique has proved more economical and was given impetus simply because of the numerous times it has been necessary to remove mechanically damaged sections of the tapered rope and replace it by long splicing.

* * *

Experimentation with a test section of 3/8 inch 3 x 36 Warrington-Seale construction as a possible replacement as dredge rope is planned because of the superior abuse-resistant and anti-rotational qualities of 3-strand rope. A rope of this construction theoretically simulates the tensile and wear characteristics of 6 x 19 Seale rope with independent wire rope center.

Winches

Briefly, the winches carrying these ropes are of two classes; hydrographic and dredge. The former winches, eight of which are on Scripps vessels carry 20,000 to 30,000 feet of 3/16 inch rope or 50,000 to 70,000 feet of 0.123 inch strand. They are powered by 15 HP, 115 V DC marine motors with resistor controls, and are capable of line speeds of 300 feet per minute. All gears are spur cut. Automatic fairleading is provided by a diamond screw shuttle. Clutch control is by means of cone frictions and the load can be lowered without power under brake restraint.

* * *

Two single drum dredge winches on Scripps vessels carry 3/8 inch rope and are powered by 30 HP DC marine motors and one single drum winch carried 1/2 inch rope and is powered by a 35 HP marine motor. Line speeds are up to 200 feet per minute. Two winches have cone friction clutches; one earlier winch possesses a 4-speed transmission. Automatic fairleading is by diamond screw shuttle. Dynamic hydraulic braking is provided on the 1/2 inch winch.

* * *

The dredge winch on the Spencer F. Baird is of the winding machine type. A 100 HP diesel engine located below decks is the prime mover to two sets of hydraulic pumps and motors. Rope is led from large diameter grooved, tandem drums located on deck to a storage reel below. Approximately 1,500 pounds tension is maintained between the two systems. One auxiliary spool of 25,000 feet of 3/8 inch rope is located on the storage drum along with the tapered cables and the two are separated by a dividing flange. Simple manipulation of the automatic fairleader allows one line to be substituted for the other. Line speeds up to 180 feet per minute are possible. A transmission system provides four speeds foward and reverse. Brake actuation is hydraulic, electric and mechanical.

* * *

The necessity for this type of winch is to decrease the very large drum stresses and rope crushing loads developed when long lengths of heavy rope are paid out. The rope itself is tapered because the weight of approximately 30,000 feet of any given diameter will equal its own yield strength.

* * *

New equipment being provided for the MV Snatch includes two hydrographic winches and a hydraulic dredge winch. The hydrographic winches are helical-gear driven 20 HP DC powered and have rapidly interchangeable drums, which may contain either 30,000 feet of 3/16 inch diameter wire rope or similar electrical cable. The winches are mounted on turntables in order to lead in any direction.

* * *

The dredge winch is a dual drum traction machine type, powered by a 150 HP DC motor driving Vicker's motors through Vicker's pumps. The stowage unit contains 42,000 feet of 3/8" to 3/4" tapered wire rope and 25,000 feet of ½" rope on separate spools. Overboard line tensions of 30,000 pounds are handled at 133 feet per minute and 8,000 pounds at 400 feet per minute. Tension between stowage drums and traction unit is limited to 1500 pounds.

* * *

In addition, a DC powered 50-foot boom length kingpost rotating crane is being furnished to facilitate launching and retrieving heavy scientific equipment and utility boats at sea. This crane has a 6,000 pound capacity at maximum outreach and a 12,000 pound capacity at twenty-seven feet outreach.

Operating Conditions

Primary problems in oceanographic usage are corrosion control, spooling, storage at sea, rigging and splicing, and winch operation.

* * *

Assuming well designed drums and sheaves to prevent rope abuse by crushing and excessive bending, the greatest enemies of wire rope are corrosion and corrosion-induced fatigue. The only solution is inspection at sea and in port coupled with a suitable lubrication program.

* * *

At the Scripps Institution log books are maintained for each winch. Manufacturer's reel numbers, initial spooling conditions, and field lubrication are noted, and each time the winch is operated, payout lengths and speeds are logged along with information on physical conditions of the rope. These books are periodically scrutinized to turn up overstress conditions which might go unnoticed.

* * *

When severe conditions are observed, a careful in-port inspection is conducted with the rope reeled onto a transfer spool at low speed. Attention is paid to worn areas, magnitude of loose and broken wires, conditions of the core, magnitude of crushing, strand nicking, changes in lay length, and loss of resiliency of the rope. If conditions and the rope construction allow it, the bad section is cut out and the rope spliced with a long splice.

* * *

In the past, industrial practice required careful measurement of the magnitudes of shiny areas along the crown of individual strands which are some indication of total wear undergone by the rope. Nomograms for each construction were used to predict allowable remaining rope life. It appears now that hidden internal corrosion invalidates this method.

* * *

It is likely that considerable corrosion takes place while rope is on the winch drum — not while it is in the water. Before application of lubricants and as rope is respooled after use, as much water as possible should be removed. Industrial technique include steam sprays and compressed air sprays. Unfortunately these are impractical at sea.

* * *

Asphalt base marine lubricants and light petroleums have been used. The former is to be preferred when protracted use is desired and should be applied at the factory with what is known as a tight wipe. Relubricating in the field should be accomplished with substances compatible with the base lubricant. Otherwise a gum forms which clogs sheaves.

* * *

Lubricants are applied at Scripps by brushing and by slow dripping of heated lubricants. Heating is beneficial since it aids penetration to the center strand.

* * *

An essential item in an inspecton and lubrication program is the retention of test specimens from each reel as a safeguard in case of anomalous failure of the rope.

* * *

Serious difficulties can be avoided by spooling rope from the dockside to the ship under controlled tension. Loosely spooled ropes are dangerous because, when unreeling at sea, the accumulated slack may pay out too rapidly with subsequent overstressing or even parting the wire if loads due to the roll of the ship are excessive.

* * *

Tension at the dockside is provided at Scripps by a truck-mounted rig into which the factory reels are placed, and which has an adjustable brake. Spooling speeds are never excessive in order to prevent loose wrapping. The first few wraps on the winch drum are generally carefully hand level wound so that the rest of the rope will lay properly. Too tight fair-leading produces scrubbing.

* * *

Spooling from a reel to a winch at sea is an onerous chore because proper fairleading is rendered difficult by space limitations and also because the vessel is rolling. Tension is applied to the reel by means of timbers placed against the flanges. Controlling this tension becomes a problem as the reel gets lighter. Unreeling from a winch onto an empty spool requires a jury-rig power take-off. This is accomplished by an endless hemp rope running from a capstan or gypsy head around cogs or slats nailed to the rim of the take-up spool. The rope must be level wound by hand.

* * *

Storage of factory reels as a deck load for future use at sea must be done with adequate protection against rope corrosion. The reels should be completely lagged with wood slats, the rope thoroughly lubricated and covered with tarpaper. The reels, themselves, if located in the weather should be covered with tarpaulins. If reels are subjected to immersion, corrosion will proceed at such a rate that after a few weeks the breaking strengths of small diameter rope will be decreased by at least 30 per cent, rendering these ropes unfit for use.

* * *

Adequate preparations should be made for the contingency of cutting and subsequent splicing of ropes at sea. A program set up with the cooperation of Pacific Wire Rope Corp. has resulted in

factory indoctrination of eight Scripps employees as splicers and splicers' helpers, so that trained personnel are readily available.

* * *

Some reasons for cutting the end of a rope lie in abuse received in coring and dredging. Due to malfunctioning of bottom signalling devices, oftentimes an excess of several hundred feet of rope is coiled on the bottom after contact is made. Upon retrieving, this rope will kink badly, often to the extent of having long festoons of rope tightly knotted at several points. After the gear has been hauled aboard this section must be cut out. Abrasion near the end of a rope fastened to a dredge is another reason for cutting, because of the action of the dredge and rope skidding along rough bottom.

* * *

Two types of patented end fittings have been used successfully at Scripps. They are the "nicopress" type which has mostly replaced U-bolt clips and the "fiege" fitting which replaces swaged and zinced terminations. The former is a Nickel-Copper sleeve which fits over the end of the rope and which is pressed onto the rope so that the metal flows in and around the wires making a fitting with more than 90% of the breaking strength of the rope. For small diameters, a tool similar to a bolt cutter is used, and for larger diameters, a hydraulic press is necessary. The time consumed per fitting is a small fraction of the time needed to make a cable clip fitting. When a termination must be readily interchanged, the "fiege" type is preferable. Bolt ends to thread into pistons and eye ends into which shackles are hooked are two common uses. In the case of a swaged or zinced fitting, either the rope must be cut and a new fitting applied, or the zinc must be heated and poured out in order to replace the fitting. The "fiege" however, may be replaced with a new termination or a completely new "fiege" applied in a matter of minutes by an experienced man. A properly made "fiege" will develop the complete strength of the rope.

* * *

The Scripps "Downwind" expedition for the international geophysical year gives some indication of oceanographic rigging problems. The vessels Baird and Horizon spent four and a half months at sea in the southeast Pacific, engaged primarily in seismic and geological studies. The Baird's dredge winch which was used for seventy temperature probe, piston core and bottom dredge lowerings, provided the major rope difficulties of the entire operation.

* * *

The winch drum contained 39,950 feet of tapered rope and 25,000 feet of auxiliary rope, all of which was either new or factory rehabilitated. It may be noted that from the installation of the winch before the Capricorn expedition of 1952 to the commencement of Downwind, 150 lowerings were made.

* * *

On Downwind, eleven winch failures necessitated rope repairs by splicing. These failures were due to excessive wildness or rotational stress which had built up in the tapered line which was coupled with a lack of power in the diesel prime mover at critical maneuvering speeds. In addition, accumulator system failures and lubrication grease pileups on sheaves and in the transmission pipe caused slippage resulting in cable kinking.

* * *

Modifications have subsequently been made on this winch. In 90 lowerings on the 1959 Gulf of California cruise, no failures occured. Winch failures on the IGY cruise resulted in sections of wire rope from 10 to 50 feet in length being pigtailed or tightly coiled under tension. Almost inevitably efforts to release these coils resulted in the rope becoming birdcaged or severely unlaid to the extent that the cable itself was greatly weakened and so enlarged in diameter that it could not pass over sheaves.

* * *

Five long splices were inserted in the tapered line in the 9/16" dia. and 5/8" dia. sections after the birdcaged portions were cut out. Six short nicopress splices were inserted in the 3/8" section of the tapered line and in the auxiliary line at various points. Splices in the 5/8" dia. were 60 feet in length and in the 9/16" dia. were 48 feet in length. Tucks were secured with the overhand knot technique. Roughly each long splicing operation took eight hours. The short nicopress splices were used in 3/8" dia. rope since the sleeves doubled the diameter and 3/4" is the largest that may be handled in the winch system. These splices were usually five feet in length.

* * *

The technique in long splicing was to pay out the cable until the bad section plus about 100 feet appeared on the storage drum. Two large cable-grips were then applied to the over-the-side section and wire pulled up from the storage drum until the bad portion plus 75 additional feet were on deck. The cable was usually so wild at this stage that it coiled tightly and continuously as slack appeared to the extent that care had to be exercised to prevent personnel from being injured. The bad portion was then cut out; the free ends hung over the side to depress the wildness and then hauled inboard and spliced in the standard fashion.

* * *

The total length of the tapered line was decreased by approximately 3000 feet cut out by splicing operations and by kinking the bitter end during probing and dredging. The auxiliary line was decreased by roughly 500 feet for the same reasons.

* * *

A major splicing problem is the requirement of splicing a new and unused section of rope to a previously used and heavily stressed rope. Great difficulty can be anticipated and a normal splice may not be accomplished. The lack of constructional stretch in the new rope will cause it to have a shorter length of lay than the old stretched rope, thus the method of laying in one strand of one rope in the space vacated by a strand of the other rope will be almost impossible unless sufficient ten-

(*Please turn to page* 383)

Fine Craftsmanship begins with

ELGIN DIAMOND

AT

JOHNSON STEEL & WIRE CO.

WORCESTER, MASS.

When die surfaces must have a perfect finish to meet the exacting demands of a precision made product, skilled craftsmen know Elgin Diamond is the finest, most reliable abrasive that can be used. Precision graded right in Elgin's own diamond laboratories, there are no oversize particles to scratch—no "fines" to decrease cutting efficiency. Elgin Diamond is permanently suspended in oil, will not settle out. Most efficient cutting consistency is assured and it's always ready to use. Every day more and more leading producers—like Johnson Steel and Wire Company—find that Elgin Diamond gives a better finish, faster . . . at lower cost!

Dept.

ABRASIVES DIVISION

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

Nylon 6 As A Wire Jacketing Material

by C. W. Taylor
Nylon Technical Department
Spencer Chemical Company
Henderson, Kentucky

A paper presented before the Eighth Annual Symposium on Technical Progress in Communication Wires and Cables, sponsored by the U. S. Army Signal Research and Development Laboratories, at Asbury Park, N.J., on December 2, 1959.

Introduction

Nylon is the generic name for a family of polyamide resins. Nylon 6 is a polyamide made from only one compound, epsilon caprolactam. On heating in the presence of water, this lactum yields aminocaproic acid which in turn undergoes the polycondensation reaction to form the polyamide. This polyamide is composed of a chain made from units each containing six carbon atoms. Hence, the name nylon 6. Spencer Nylon NX-121 belongs to the nylon 6 or polycaprolactam type.

* * *

Spencer Nylon is manufactured by continuous polymerization rather than the batch process. With this continuous polymerization process, it is possible to manufacture nylon in uniform lots under rigid quality control specifications. These controlled polymerization conditions provide compositions with melt viscosities ranging from conventional to a melt viscosity higher than any other commercially available nylon.

Physical Properties

The physical properties of some of these nylon compositions will be discussed with special emphasis on such properties as heat stability and abrasion resistance which are important in wire fabrication. Spencer Nylon NX-121 is a nylon 6 formulation designed for those wire jacketing applications which require high heat stability. This compound contains an efficient heat stabilizer which does not tend to discolor on exposure to visible or ultra-violet light.

* * *

When properly extruded, this new material is fully suitable for use under military specifications Mil-W-5086A, Mil-W-76A and Mil-W-16878B/2A. The physical properties of Spencer Nylon NX-121 are shown in Table I. These properties indicate that nylon is suitable for applications where an exceptionally tough jacketing material is required. Spencer Nylon NX-121 has a high tensile strength, good flexural strength, improved impact strength and excellent resistance to deformation under load even at high temperatures. With this high heat distortion factor, it is possible to upgrade the temperature rating of many primary vinyl insulated wires from 10 to 15° C. In addition, nylon 6 has superior abrasion resistance and is not affected by petroleum products such as gasoline, oils and lubricants.

TABLE I
TYPICAL PHYSICAL PROPERTIES OF NX-121

PROPERTY		UNITS	ASTM TEST METHOD	DATA DRY	DATA CONDITIONED
TENSILE STRENGTH	73°F	PSI	D638-52T	12,400	7,800
YIELD POINT	73°F	PSI	D638-52T	12,400	6,900
ELONGATION	73°F	%	D638-52T	40	170
IMPACT STRENGTH-IZOD	73°F	FT. LB./IN. NOTCH	D256-54T	0.8	3.0
SHEAR STRENGTH		PSI	JOHNSON TOOL	8,400	7,100
FLEXURAL STRENGTH		PSI	D790-49T	15,400	5,500
FLEXURAL STIFFNESS		PSI	D747-50	283,000	95,500
HARDNESS-ROCKWELL		R SCALE	D785-51	118	
HEAT DISTORTION	264 PSI	°F	D648-45T	160	160
	66 PSI	°F		356	356
EXPANSION PER °F		IN./IN.	D696-44	4.8×10^{-5}	
SPECIFIC GRAVITY			D792-50	1.14	
DIELECTRIC CONSTANT:					
60 CYCLES			D150-54T	5.3	
10^3 CYCLES				4.6	
10^6 CYCLES				3.8	
POWER FACTOR					
60 CYCLES			D150-54T	0.06	
10^3 CYCLES				0.05	
10^6 CYCLES				0.03	
FLAMMABILITY		IN./MIN.	D635-44	SELF EXTINGUISHING	

NOTE: TENSILE TESTS RUN AT 2 IN./MIN.

DRY DATA ON SAMPLES CONTAINING LESS THAN 0.3% MOISTURE.
CONDITIONED DATA ON SAMPLES WITH EQUILIBRIUM MOISTURE CONTENT (2.5-3%) FOR 73°F. 50% RELATIVE HUMIDITY. DI POINT PROCEDURE - 48 HRS. OVER K_2SO_4

Processing Conditions

Certain conditions, however, do materially contribute to the end characteristics of the product or are particularly desirable in the use of this specific formulation. Table II shows some typical processing conditions for Spencer Nylon NX-121. Of these conditions, the most important is the stock temperature. As will be shown later, a moderate stock temperature and the use of a light screen pack, similar to the 40-60-80 pack used in our run, is desirable with NX-121. This product has a slightly higher viscosity than do most earlier wire formulations in order to increase the ease of the jacketing operation. Thus, a light screen pack will avoid excessive build-up of frictional heat within the extruder and insure a minimum heat history for the jacket and provide the best possible resistance to heat degradation.

TABLE II
TYPICAL PROCESSING CONDITIONS-2½ INCH N.R.M. EXTRUDER

		NX 121	NX122	NX 127
CYLINDER TEMPERATURE - °F	ZONE 1	470	485	520
	ZONE 2	465	480	505
	GATE	465	475	500
DIE TEMPERATURE-°F	ZONE 1	470	480	505
	ZONE 2	465	480	495
STOCK TEMPERATURE-°F		470	490	530
SCREW SPEED-R.P.M.		14	10	6
MACHINE LOAD-AMPS		7	7	6.5
VACUUM-INCHES		5.5	7	10
TAKE OFF SPEED-FT./MIN.		300	400	200
WATER BATH TEMPERATURE-°F		75	75	75
DISTANCE TO WATER BATH-INCHES		13	13	13
BARE WIRE SIZE (COPPER)-GUAGE		18	18	18
DRAWDOWN RATIO		12.5	12.5	12.5
NOMINAL JACKET THICKNESS-MILS		6	6	6
SCREEN PACK-MESH SIZE		40-60-80	40-60-80	40-60-80

Range of Viscosities

As mentioned previously, the continuous polymerization system can be controlled to obtain variable molecular weight compositions. Figure 1 shows the molecular weights of the three compounds used in this investigation. It can be seen that NX-121 has the lowest molecular weight of the compounds under consideration and that the molecular weight increases slightly for NX-121 and substantially for NX-127. Figure 2 shows a comparison of the ASTM relative solution viscosities of these three materials. I might add at this time that NX-127 having an exceptionally high viscosity is not recommended for wire fabrication. It was included in this investigation, however to determine the effect of various molecular weights on subsequent physical properties. NX-122 has a somewhat higher viscosity

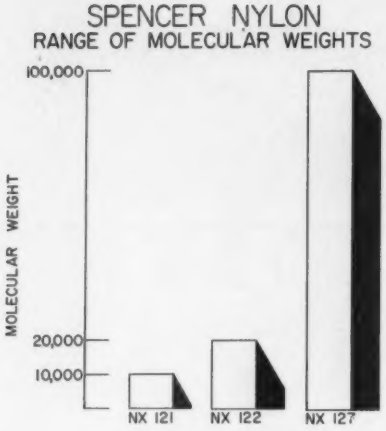


Fig. 1

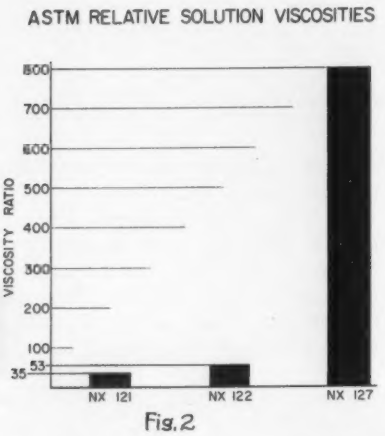


Fig. 2

than NX-121 and is recommended for applications where heavier wall thicknesses and other extrusion conditions merit consideration.

Heat Aging Characteristics

Wire samples were prepared from materials having a wide viscosity and molecular weight range. These were NX-121, a conventional molecular weight compound; NX-122, an intermediate molecular weight compound; and NX-127, a very high molecular weight compound. These samples consisted of 18 guage bare copper wire, jacketed with a nominal 6 mil coat of nylon. Specimens from each sample were heat aged in accordance with Mil-W-16878B/2A. This test consists of heat aging in an oven at 150°C. (300°F.). In each case, the testing was continued until complete failures had been obtained. As mentioned previously, the processing temperature or stock temperature at which these compounds were run, had a decided effect upon the resulting heat aging characteristics of the wire sample. The results are shown in Figure 3. Here it can be seen that as the stock temperature was increased from 460 to 510° F., the resulting heat aging time of wire samples decreased from 8 to 3 days. Likewise, NX-122 samples decreased in heat aging time from 9 days when processed at 490°F. to 5 days at 530°F. Therefore, it is evident that lower processing temperatures should be used to obtain the maximum heat aging of wire samples. The shaded areas of Figure 3 indicate the recommended processing temperature ranges for NX-121 and NX-122.

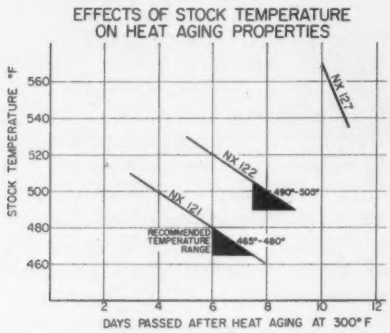


Fig. 3

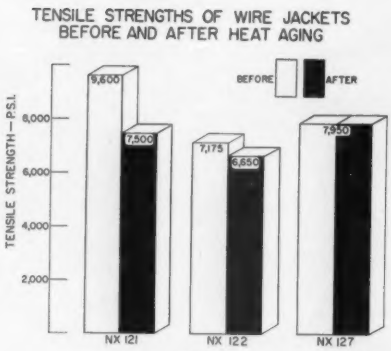
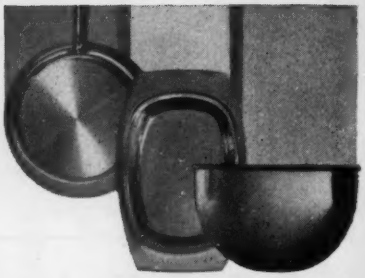


Fig. 4

Figure 4 gives the tensile strengths of nylon jackets which had been stripped from the wire. It was necessary to soak the specimens in water in order to remove the jackets satisfactorily. Following this operation, all jackets were redried in a vacuum oven. Then one-half of the jackets were allowed to condition for four days at 73° F. and 50% relative humidity prior to testing. The other half was heat aged for six days at 150° C. and then allowed to condition for the same length of time as the controls. Now, referring to Figure



call WESTERN UNION operator 25
(EFFECTIVE APRIL 1960)

Your J&L stainless steel distributor can serve you better *because J&L serves him better,* backing him with the full facilities of J&L's Stainless and Strip Division.

Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; and can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

Technical assistance in solving production problems is also available from your J&L distributor. And when those problems are connected with an application using stainless steel, J&L's own staff of technical specialists will promptly answer your distributor's call for additional help.

Even when advanced research is required you can call on your J&L distributor in confidence. He will be happy to discuss your problem because he knows he is backed by one of the world's most respected teams of metallurgists—J&L's own staff in laboratories at Detroit and the famous Graham Research Laboratories at Pittsburgh.

Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

J&L—a leading producer of stainless steel and precision cold rolled strip steels

STAINLESS
SHEET • STRIP • BAR • WIRE

consistent quality
production
depends on
consistent quality
stainless
steel
Call Western Union Operator 25
for the nearest source of Consistent Quality J&L Stainless Steel
Jones & Laughlin Steel Corporation · STAINLESS and STRIP DIVISION · DETROIT 34

4, it can be seen that NX-121 retained about 78% of its original tensile strength. The retained tensile strengths of the other two materials increased as their molecular weights increased. The intermediate molecular weight compound, NX-122, retained 93% and NX-127, with a high molecular weight, retained 100% of its original tensile.

* * *

Elongation data obtained simultaneously with tensile strengths showed 400, 300 and 200% for NX-121, NX-122 and NX-127, respectively. After heat aging, the best results were obtained for NX-122 which still gave 75% of its original elongation. NX-121 retained 5% of its elongation and NX-127 50%. No explanation can be offered for the lack of correlation of these results.

* * *

Tensile and elongation tests were run according to ASTM method D638-52T at 2 inches per minute.

* * *

Several other variables were investigated concurrently. It was found that the length of time that specimens were allowed to cool prior to bending around the mandrel had a definite effect upon the heat aging results. For the data shown in Figure 3 the specimens were cooled 2½ hours prior to bending around the mandrel. Similar specimens cooled 24 hours prior to bending ran 4 days longer prior to failure. The additional heat aging time gained by cooling 24 hours prior to bending did not hold for nylon jackets fabricated over a vinyl primary insulation. Specimens made from NX-121 showed no variations in heat aging properties whether aged in a circulating or non-circulating oven. However, NX-122 and NX-127 ran approximately 3 days longer in a non-circulating oven than in a circulating oven.

* * *

An effort was made to determine the effect of the water bath temperature and the distance to the water bath on the heat aging properties of the various compounds. Table III shows that there were no

TABLE III

WATER BATH TEMPERATURE AND DISTANCE VS HEAT AGING PROPERTIES

	DAYS PASSED AFTER HEAT AGING AT 300°F	
WATER BATH TEMPERATURE (DISTANCE-13")	75°F	145°F
NX 121 (STOCK TEMPERATURE-470 °F)	8	8
NX 122 (STOCK TEMPERATURE-510 °F)	7	7
NX 127 (STOCK TEMPERATURE-530 °F)	11	12

DISTANCE TO WATER BATH (TEMPERATURE-75°F)	3"	13"	36"
NX 121 (STOCK TEMPERATURE-470°F)	8	8	8

TABLE IV

PROCESSING CONDITIONS VS ABRASION RESISTANCE

	INCHES OF TAPE PER MIL		
	NX 121	NX 122	NX 127
VARIABLE-STOCK TEMPERATURE			
RECOMMENDED	1.02	0.83	0.81
EXCESSIVE	1.09	1.08	1.08
VARIABLE-WATER BATH TEMPERATURE			
75 °F	1.02	0.78	0.81
145 °F	0.83	0.75	0.93
VARIABLE-DISTANCE TO WATER BATH			
3 INCHES	0.67		
13 INCHES	1.02		
36 INCHES	1.06		

NOTES: MIL-W-5086 TEST PROCEDURE.
ALL JACKET THICKNESSES WERE 6.5 MILS.
21 MIL JACKET GAVE 3.4 INCHES PER MIL.
TAPE-GARNET CLOTH, 4/0 GRIT.

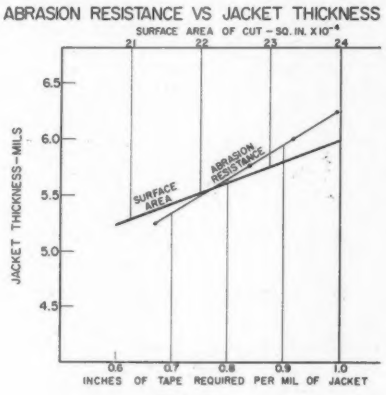


Fig. 5

significant differences in heat aging properties whether the materials were run into a 75°F. or a 145°F. water bath. Also, no differences were noted in heat aging properties when the distance to the water bath was varied from 3 to 36 inches.

Abrasion Resistance

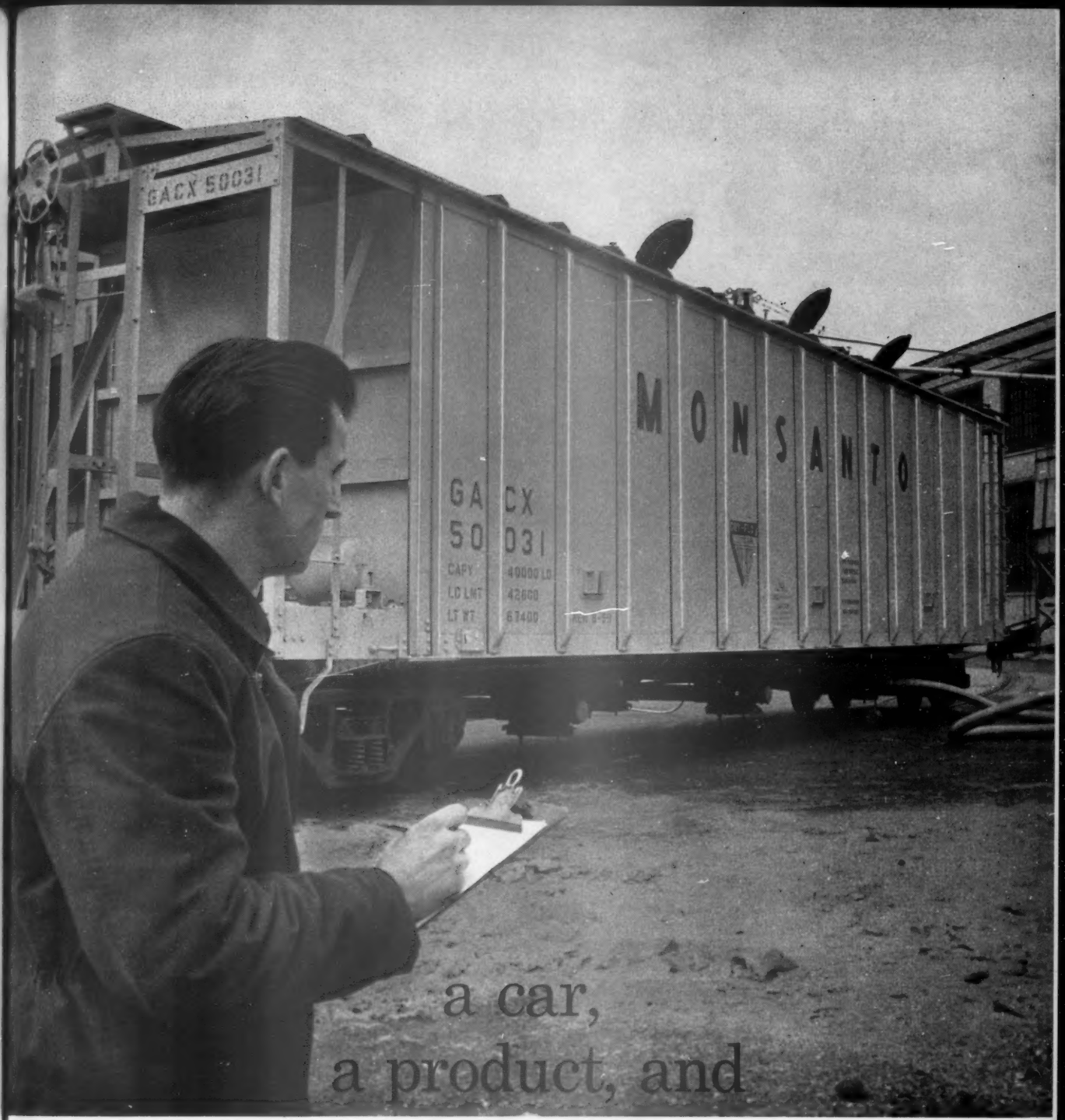
In Table IV are shown the results of variable processing conditions on abrasion resistance. The abrasion resistance is recorded as the inches of tape required to cut through each mil of nylon when tested in accordance with military specification Mil-W-5086A. Although the results were not conclusive, it may be stated that NX-121 had a slight advantage in abrasion resistance over higher molecular weight materials. Another fact to be noted is that a low abrasion resistance was obtained when the water bath was close to the die. This can be attributed to obtaining a much more amorphous material with a quick chill as compared to a more crystalline material when the water bath was farther away. Higher amorphous content produces improved clarity.

* * *

It should be noted here, however, that the abrasion results obtained in this method are highly dependent upon the thickness of the jacket. It is shown in Figure 5 that as the jacket thickness increases the abrasion resistance increases. This, however, is believed to be due to the increased surface area and volume encountered as thicker jackets are run. The heavy line in Figure 5 shows the relationship between the calculated surface area versus the initial jacket thickness at the moment the cut reaches the solid conductor. Here, it can be seen that the surface area increases approximately the same rate as the abrasion resistance appears to increase. As a further example, a jacket of 21 mils in thickness was run on this same test and gave results indicating 3.4 inches of tape per mil of jacket. Therefore, it is imperative that the jacket thickness be considered whenever abrasion resistance figures are reported.

* * *

In summary, I would like to say that Spencer Nylon NX-121 has all the physical properties essential to withstand the most rigorous service conditions. The continuous polymerization process makes available resins with variable viscosities which can be adapted to each fabricator's particular requirements. Satisfactory heat aging results can be obtained with these materials, particularly if processed within recommended temperature ranges. The effects of water bath temperature and distance on heat aging properties were negligible, and abrasion resistance varied only slightly under different processing conditions. Considering the ease of processing, this versatile material offers unlimited opportunities to manufacturers.



a car,
a product, and

a valuable new service...

This car carried the first Monsanto bulk-hopper shipment of weather resistant polyethylene compound to Western Electric's Kearny Plant. The polyethylene was Monsanto's 14202, now approved by Western Electric for high molecular weight black polyethylene telephone cable jacket applications. And this bulk handling service for polyethylene is one of a long list of Monsanto developments with immediate value to wire and cable manufacturers in cutting material costs, increasing plant efficiency, and improving products. If you are considering bulk handling for your plant, send for a new Monsanto report based on a comprehensive 5-year study of the subject. Monsanto Chemical Company, Plastics Division, Room 736, Springfield 2, Massachusetts.

Monsanto

MONSANTO ACTIVATOR IN **PLASTICS**

Continuous Cycle Heating-Cooling Furnace Provides Better Structure Control in Annealing for Machining

By A. G. Sturrock
Chief Metallurgist
Wyckoff Steel Company
Chicago, Illinois

Difficulties encountered in machining steel may be due to non-uniformity of microstructure. Fundamental requirement of good machining is structure and uniformity of structure is difficult to obtain consistently. The author's Company uses a continuous cycle, heating-cooling furnace to obtain consistent, uniform structure through the bar, through the furnace load, and from job to job.

The 70 foot long roller hearth furnace uses atmosphere in six chambers to provide a neutral, carbon correcting, or high nitrogen atmosphere, to protect the bar surface. Heating and cooling is fast and controlled automatically.

The microstructure of the steel is the most important factor in the machinability of cold drawn steel bars. Although many other factors are involved in the machining, such as tooling, cutting oils, operator, machines and others, the fact still remains that structure is fundamental. Other machinability factors can be changed or adjusted when they are wrong, but without proper structure, maximum machinability cannot be obtained.

* * *

Consistently achieving uniformity of structure throughout each bar and the entire furnace load, time after time, has been a real "nut to crack". Uniformity of structure has been difficult or practically impossible to achieve with many batch type annealing furnaces. The former, conventional methods of annealing, have produced bars varying from 100% pearlitic on one end, to almost complete spheroidization on the other. The same degree of variation has also been found in a load of bars.

* * *

This problem of non-uniform structure has contributed more to the detriment of machinability than all other factors combined. Tests of structure, when poor machinability is encountered, are not dependable if structure is not uniform. It is possible that a tool may cut through an area showing poor structure and then break down in an area of good structure, simply because the tool had lost much of its life in cutting through the poor structure. Along with uniformity of structure during heat treatment, it is of prime importance that the supplier of the steel produce the original structure repetitively uniform to the customer's specifications. Because of differences in machining setups between different machining plants, the structure that is best suited for a particular setup must be determined by the individual machining setup. Even in the machining of the same part, the same structure may not be suitable for different plants. One may be machining the part on an automatic machine using light cuts and high speed, while the other may be using a turret lathe with a heavy cut at a lower speed. Depending on the grade of material, the first could use a pearlitic structure, while the latter might find that a predominantly spheroidized structure would be more suitable.

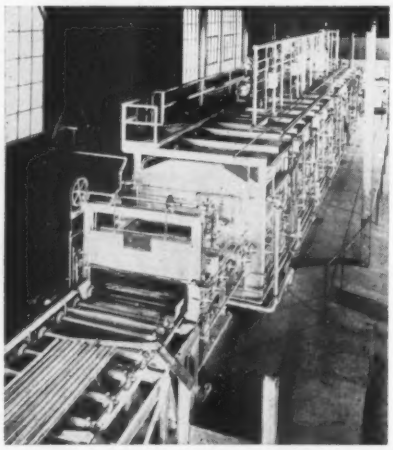


Figure 1 — The 150 ft. cycle heating and cooling setup extends across three bays. Bars enter one bay and exit another. This installation acts as a transfer unit as well as a continuous furnace. Vestibules at both ends prevent escape of furnace atmosphere and keep the furnace from being contaminated by outside air. * * * * * * *

* * *

From the standpoint of material alone, the machinability problem reduces itself to three main factors; uniform structure from the mill, knowledge of the customer's requirements and repetitive reproduction of the structure with heat treatment according to specification.

* * *

Our company had been meeting these requirements for many years, by laboriously annealing in two batch furnaces. The first furnace was used for heating and holding for complete austenizing. The second unit was a convection furnace to which the work was transferred for fast uniform cooling to the proper transformation temperature. The process had been accomplished at the expense of smaller loading and more handling. Recently, a continuous roller hearth, cycle heating and cooling furnace has been installed to do the job more efficiently and at higher production rates. We cold finish steel bars in plants at Ambridge, Pennsylvania; Newark, New Jersey; Putnam, Connecticut; and Chicago, Illinois. The standard cold finished carbon steel bar shapes are rounds, hexagons, squares, and flats. In addition bars in other shapes can be supplied. Bars, in a number of grades of steel, can be supplied cold finished (cold drawn, turned and polished,

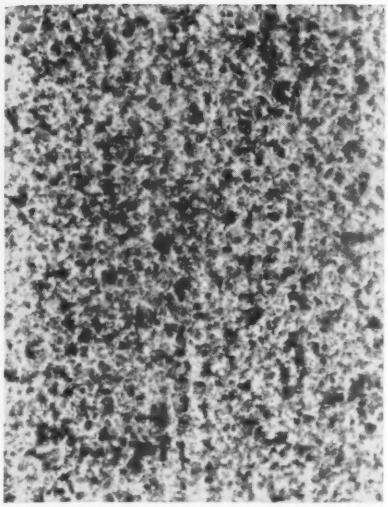


Figure 2—Photomicrograph of an annealed bar of A-4140 steel at 100X exhibiting the uniform structure.

Figure 2-A—Photomicrograph of the same steel sample as figure 2. However this photomicrograph is 1000X and shows the pearlitic plates uniformly distributed in the ferrite matrix.

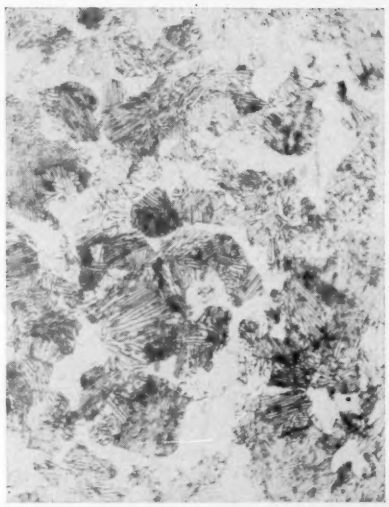


Figure 2-B—Photomicrograph at 1000X of a sample from an annealed bar of A-8642 steel, and shows almost the same uniformity and distribution of pearlite and ferrite as figure 5-A.

turned, ground and polished) from hot rolled bars without any heat treatment. However, many orders specify heat treatment, annealing, normalizing, or hardening and tempering, in both carbon and alloy grades, prior to cold finishing or stress relieving after cold drawing and straightening.

* * *

The cycle heating and cycle cooling furnace was installed at the company's Chicago plant. The furnace, 70 feet long, was built and erected by Surface Combustion Corporation, Toledo, Ohio. By combining continuous high production with automatic control, better heating and cooling accuracy has been obtainable, resulting in greater and more complete control over the uniform structure of the bars.

Controlled Furnace Atmosphere Protects Surface

Work is always under the protection of accurately controlled RX generated and natural gas, or low combustible-high nitrogen NX generator gas. Carbon potential can be maintained in the furnace to provide a neutral or carbon restoring atmosphere. Bars processed through this furance are scale-free and the surface chemistry is uniform with the body of the bar. Because the bars are spread across the rollers of the hearth in a thin layer, often only one layer deep, heating and cooling is fast and accurate, providing uniform structure and hardness for the length of the bar and across the entire load.

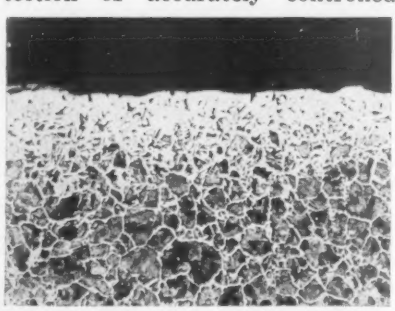


Figure 3—Decarburized surface and coarse hot rolled structure of C-1045 steel etched in picral. This photomicrograph is 100X.

Restores Carbon During Processing Cycle

An important feature of the cycle heating and cooling furnace is the ability to restore carbon to bars that have been decarburized during hot rolling operations. Here again, accurate control of heating conditions and atmosphere potential made possible by the design of the furnace and automatic atmosphere control, provides proper conditions for replacing carbon in the decarburized surfaces of the bars. This is especially important where bars are used for products that must be induction hardened on the surface without machining certain areas of the original surface.

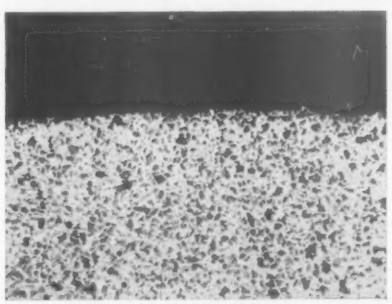


Figure 3A—Same magnification of an identical type steel, etched in picral, exhibiting carbon restored surface and grain refinement resulting from furnace treatment.

Continuous Furnace Provides High Production

The furnace operates automatically except for loading and unloading. A 40 ft. roller charge table and a 40 ft. roller discharge table is provided for easy charging and discharging of the work. The furnace heats to 1600°F, and cools 4000 pounds of work per hour with a minimum of manual attention. Temperatures of 1800° F. can be attained in the furnace. Two men operate the furnace, one at each end.

Synchronized Alloy Rollers Add Flexibility

Work travels through the furnace on 35 nickel-15 chrome alloy rollers that extend through the side walls of the furnace and are mounted on water cooled bearings. They are power driven through sprocket and chain drives, synchronized with the charge and discharge table rollers. The chains are driven through variable speed

transmissions to provide proper speeds of travel for cycling the various size of loads. Rollers are flanged to prevent work from striking the furnace walls.

Multiple Heating-Cooling Chambers Provide Many Cycle Possibilities

To provide flexibility of cycles, the furnace has six separate chambers. The first two are usually used for heating, the third, fourth, fifth and sixth are used for either heating or cooling. Heating is accomplished through a series of "W" type radiant tubes placed above and below the roller hearth. Cooling is accomplished by inspirating room temperature air through the radiant tubes. The tube assemblies in the first chamber are installed with a by-pass for manually controlling the cooling rates, while the others are automatic. The inlet end of the tubes are provided with a special combination premix and diffusion burner, and the outlet end with an eductor, which creates a suction at the outlet end. This feature provides a long flame for even heating of the element and also inspirates the air used for cooling the element when desired. All burners are individually piloted.

Eductors Prevent Atmosphere Contamination

The eductor type tubes provide uniform heating through the length of the tube, and also insure that the atmosphere of the furnace is not contaminated by products of combustion. The tubes, because of the internal suction, are always at a lower pressure than the furnace chambers. Therefore, if a leak should occur in a tube after being in service, the only loss would be a certain amount of furnace atmosphere which would be sucked out through the tubes. This feature also allows the furnace to operate until a convenient time is found to replace the tube.

Atmosphere Generators Are Automatically Controlled

The two types of generated atmosphere gas are supplied from two 5600 cfh Surface RX® (endothermic) generators and one 10,000 cfh Surface NX® (nitrogen) generator. The RX gas is monitored by a Surface Autocarb®, automatic signalling dewpoint controller at each generator and a two point Autocarb strip chart electronic dewpoint recorder at the furnace. The recorder will record the dewpoint at the furnace, two samples at a time. However, the sampling lines are manifolded so that all six chambers can be sampled. A Bailey automatic, single pen recording controller is used to control the total combustibles in the NX generated gas at the generator.

Fans Provide Ample, Positive Circulation

To provide sufficient circulation of furnace atmosphere through the load, alloy bladed fans are mounted in the roofs of each of the first five chambers. These fans permit fast uniform heating of the load, and also promote fast uniform cooling of the load when necessary. The fans provide ample circulation for mixing the natural gas with the RX generator gas when added carbon potential is required.

* * *

Furnace temperature control equipment consists of one, two position indicating and recording strip chart recording controller; one indicating-recording strip chart controller with a 1400° F. contact and four indicating and recording single point strip chart controllers. All instruments are mounted on a single panel in a control room near the furnace. The operator is alerted in case of failure by an alarm system and the equipment is protected by suitable gas shutoff valves and switches.

* * *

For running through the continuous furnace the first step is to establish the required conditions of temperatures and atmosphere. The operator rolls the proper number of bars on the charge table rollers and the bars are started through the furnace. The work first passes through an air curtain at the furnace door, then through an eight foot vestibule containing four sets of heat resisting alloy strip curtains which assist in maintaining the atmosphere. The bars then pass through two chambers used to heat and hold the work at austenitizing temperatures. Depending on the size of the bars and the cycle, the heating can be in any of the first five chambers. After proper austenitizing time, the bars are quickly cooled to transformation temperature as they pass through the cooling zones. The bars then pass through a vestibule at the exit end, similar to the one at the charge end, and to the discharge table. As soon as the load of bars has completely passed on to the table, the operator presses a button and lifting arms between the discharge rollers raise the load, allowing the bars to slide into pockets that parallel the discharge table.

* * *

When enough bars have accumulated in the pockets to constitute a "lift" they are removed and returned for further processing such as cold drawing or other cold finishing operation. The bars are descaled by pickling or blasting and lime coated.

* * *

This furnace has been in service for several months and has proven very satisfactory. It is necessary that the austenitizing temperature and the transformation temperature be selected to accommodate the particular steel to be run. When these conditions are established the ability to reproduce the results is likewise established. Hardness and structure checks have been made on samples from all positions of a load and prove the uniformity of conditions.

YOU, AS A WIRE MAN
NEED THE ASSOCIATION
AND
THE ASSOCIATION NEEDS
YOU!

Won't you join for your own and the industry's good?
Send for booklet.

THE WIRE ASSOCIATION
RICHARD E. BROWN, Exec. Secy.
453 MAIN ST. STAMFORD, CONN.

Color Standards for Plastic Insulated Communication Cables and Wires

by C. R. Ballard and W. W. Newman, Jr.
Rural Electrification Administration
United States Department of Agriculture
Washington, D.C.

A paper presented at the Eighth Annual Symposium of Technical Progress in Communication Wires and Cables at Asbury Park, N. J. on December 1, 1959.

Introduction

The outside plant used in telephone systems has undergone revolutionary changes in its general make-up during the past decade. One of the major changes has been the widespread acceptance of plastic insulations and jackets in the design of cables. These new materials were introduced into cable construction about ten years ago. The evolution of plastic insulated cables during the past ten years has been both rapid and phenomenal. The introduction of new and improved polyethylenes and the improvement of manufacturing techniques have resulted in cables having better electrical and physical properties. By 1959, 85% of all cables used in the REA Program were plastic insulated.

* * *

One recent improvement in cable designs has been color coding of the cable pairs to render each pair readily distinguishable from all other pairs in the cable. This color coding of pairs eliminates the necessity of electrical testing to estalish the identity of the pair and consequently substantially increases the speed of splicing. This increased speed is directly evidenced by a reduction of cost for splicing and loading of cables, and placing terminals for distribution purposes. Substantial operational benefits and maintenance savings are obtained where color coding is used. At the time color coding was introduced into plastic cable designs the manufacturing processes had improved to the point where 100% good pairs could be produced so that so-called "even count" cables[1] were adopted as a standard. This eliminated the special treatment and bookkeeping confusion which has always been associated with the spare pairs in terminals, distribution frame terminations, etc. The advent of "even count" cables simplified the problem of fully color coded cables.

Selection of Basic Colors For Color Code

During the latter part of 1957 several discussions were held with officials of the American Telephone and Telegraph Company, and with manufacturers of plastics and color pigments, regarding colored polyethylene and polyvinyl chloride compounds. We were informed by the American Telephone and Telegraph Company of the basic color code which they proposed to use. This basic code employed ten standard colors. The use of ten standard colors (in color coded groups of 25 pairs) permits individual identification of up to 600 pairs under one sheath. In practice, purely for the reason of physical size, plastic cable used by REA has generally been restricted to 400 pairs. Discussions with the manufacturers of plastics and pigments indicated that sufficient research had been conducted to insure that suitable colored plastics as proposed in the new color code could be made available. Numerous discussions with manufacturing representatives of the wire and cable industry indicated the desirability of an industry-wide standardization of a single color code. The color spacing selected is in close agreement with the recommendations of the Vision Committee of the National Research Council.

* * *

After the introduction of the standard color code for cable conductors in early 1958, there was a general trend in the industry to use the same color code for outside distribution wire and station wiring. This was desirable simply because splicers, outside plant construction and maintenance personnel, and station installers could benefit by having to learn only one color code.

* * *

The use of outdoor vinyls presented a problem in deriving a single color code for all plastics. Outdoor exposure of vinyls necessitated extreme care in the choice of antioxidants and pigments to insure maximum weatherability of the materials. Studies of colored vinyl compounds by the industry and the Bell Laboratories over a number of years have indicated that certain formulations are acceptable for use. However, the colors which are obtainable are not ideal from a color standpoint. The vinyl red, for example, does not look like the polyethylene red. We hope that outdoor vinyls may be improved from the standpoint of ideal color selection, so that ultimately the colors for polyethylenes, outdoor polyvinyl chlorides and indoor polyvinyl chlorides will be identical.

Problems Associated with Colored Plastics

Introduction of these new designs of cables[2,3] into general use has brought with it new problems for the consumer, the producer, and particularly for agencies preparing specifications to cover the end use requirements for both physical and electrical characteristics of this product. The introduction of ten different colors used in wires and cables insulated with polyethylene and polyvinyl chloride not only brought new problems but also intensified some of the existing ones. The following were some of the most significant considerations after the color code was introduced:

1. **Uniformity of electrical properties of the pairs with ten different colored conductors.**
2. **Resistance to fading of the insulated conductors to insure long life of the color coding.**
3. **Uniformity of colors from one manufacturer to another.**
4. **The selection of a suitable system for specifying colors and color tolerances in cable and wire specifications.**

Uniformity of Electrical Properties

Continuing advancements in voice freqency repeaters have improved their quality and have made substantial reduction in cost. Loaded, repeatered trunk circuits are now involved in some 15% of all new cables installed in REA borrowers' telephone systems. Indications are that loaded, repeatered trunk circuits, both extended area service and toll, will increase. The necessity of uniform mutual capacitance is expressed in terms of maximum gain obtainable from repeaters[4]. Capacitance variation in cable pairs have a direct effect on the structural return loss of the circuit which dictates the amount of gain that can be obtained from repeaters before singing or echo occurs. This problem has been experienced in a general way over the past years. In most cases, it has been necessary to make capacitance-deviation test splices to obtain the desired capacitance uniformity. Prior to color coding, cable pairs were all random spliced so that additional benefits in high return loss were obtained. This factor was lost entirely with the introduction of color coding where color-to-color splicing was employed. Random splicing of color coded cable could be employed on trunk circuits but this would destroy the color code for the entire cable. However, since most trunk cables in REA-financed systems also contain subscriber circuits, we are not willing to make this sacrifice unless absolutely necessary.

* * *

In short, many variables affecting capacitance uniformity existed prior to color coding, such as conductor diameter variations, uniformity of wall thickness of plastics on conductors, and uniformity of twining and stranding of conductors. The use of colored plastics for conductor insulation could also adversely affect capacitance uniformity if improper pigments are used and if poor dispersement of these pigments is obtained. Discussions with manufacturers of polyethylenes indicate that with the use of proper pigments and proper dispersement it is now possible to obtain very uniform capacitance. An indication of this uniformity is as follows:

Colored Polyethylene Insulations

Color	Dielectric Constant	Color	Dielectric Constant
Blue	2.296	White	2.297
Orange	2.290	Red	2.289
Green	2.296	Black	2.305
Brown	2.298	Yellow	2.295
Slate	2.292	Purple	2.290

Resistance to Fading

It will be necessary that the colored polyethylenes and polyvinyl chlorides provide readily distinguishable color identification of each individual pair throughout its life in plant. We do not expect that polyethylene insulated conductors will be exposed unduly to sunlight. We do expect, however, that short term exposure to sunlight of polyethylene conductors at splice and terminal points, as well as the use of polyethylene conductors for terminations directly on the main frame, could cause some problems with fading of the conductors. The most significant problem associated with fading of the conductors will be encountered with outdoor polyvinyl chlorides. The direct exposure of wires jacketed with colored vinyls is a sereve test of both the aging characteristics of the materials, and the permanency of the colors. The problem here is to select compounds specifically designed for outdoor use and color pigments so resistant to fading in direct sunlight that pair identification will be possible over the life of the wire.

* * *

Extensive studies by Bell System engineers and vinyl compound manufacturers have resulted in the selection of base compounds and pigments which appear to have satisfactory aging characteristics. The requirement of providing protection against sunlight necessitates selection of some colors that do not agree with polyethylene colors. Some samples of wires wherein the manufacturer had utilized proper compounds and pigments were examined and found to be unsatisfactory. Poor dispersement of the color pigments had resulted in weak and variable colors, as well as the degradation of electrical properties. The colored polyvinyl chlorides used as insulation on station wiring, which is not exposed to sunlight, have less stringent fading and durability requirements and consequently will permit the use of colors corresponding to the polyethylene colors.

Uniformity of Colors From One Cable Manufacturer to Another

Since the introduction of fully color coded plastic cables in the REA Program, careful examination of cables produced by different cable manufacturers have indicated a wide variation in the colored polyethylenes used as conductor insulation. For example, the brown insulation produced by one manufacturer may look very much like the orange insulation produced by another manufacturer. This presents serious problems in identifying colors for splicing, terminating, etc., when all the cable used on a project is not purchased from the same supplier.

* * *

The REA specifications now attempt to set forth performance requirements, both physical and electrical, to assure a uniform product from manufacturer to manufacturer. However, the present requirement is that colors shall "be readily distinguishable." This does not satisfy the ideal uniformity of colors and would indicate that a means must be found to specify color tolerances that can be administered by manufacturers, inspectors and purchasers to obtain adequate and uniform colored insulations. The mere designation of basic colors in the specifications is not sufficient. The desired color and the tolerances for each color must be set forth as to be easily understood. Color matchings must be made without the use of skilled laboratory technicians and expensive colorimetric equipment.

* * *

Some difficulties have been found by manufatcurers in the mixing of their own colored compounds even though proper com-

pounds and pigments were utilized. Poor dispersement of pigments can affect the dielectric strength of the material, the uniformity of color, and the uniformity of capacitance. Metering in the extruder, unless pigments have been properly predispersed, has generally resulted in weak or poor colors.

Selection of a System for Specifying Colors and Color Tolerances

A number of color systems and collections of color samples are in existence. Most of these fall into one of three basic categories. One is a colorant mixture system, produced by systematic mixtures of colorants such as paints, inks, dyes, etc. Another is the color mixture system, produced by additive mixtures of colors, often by disk mixture. The third type is the color appearance system, produced according to the visual relationship between colors.

* * *

Some of the characteristics considered in selecting a color system were:

1. **The system should be nationally recognized and readily comprehended by the average color matcher and inspector.**
2. **Materials required to implement this system should be readily available at reasonable cost.**
3. **The system should lend itself to written specifications and should be sufficiently versatile to allow necessary and periodic changes.**
4. **The system should specify color according to its visual (appearance) attributes, rather than physical attributes (dominant wave length, purity and reflectance) because the users will be concerned with appearance.**
5. **Tolerances, in visual units, should be easily specifiable.**

* * *

Several color systems were evaluated on the above characteristics. Only one system met all of the requirements. This system was discussed with the National Bureau of Standards, with several manufacturers of wire and cable, and with manufacturers of plastics. It is known as the Munsell System of Color Notation.

The Munsell System of Color Notation

The Munsel System [5,6] is essentially a scientific concept for describing and analyzing color in terms of three attributes, identified in this system as Hue, Value and Chroma. The method of color notation developed by **A. H. Munsell**, as the principal feature of this system, arranges the three attributes of color into orderly scales of equal visual steps, so that the attributes become dimensions or parameters by which color may be analyzed and described accurately under standard conditions of illumination. The color that is normally associated with an object is actually a combination of the color quality of the light incident upon it, the color reflecting qualities of the object itself and the color vision of the observer. Color judgments should therefore be made by an observer with normal color vision and under a suitable light source. The colors were selected according to their appearance under C.I.E. Illuminant C, equivalent to average north daylight having a color temperature of approximately 7400° Kelvin and this is the illuminant recommended for use with these charts. Personnel working with this color specification should be tested using a suitable color vision test instrument.

* * *

Chromatic colors in the Munsell System of Color Notation are divided into five principal classes which are given the Hue names of red, yellow, green, blue, and purple. A further subdivision yields the five intermediate Hue names of yellow-red, green-yellow, blue-green, purple-blue, and red-purple, which are combinations of the five principal Hues. Capitalized initials such as "R" for red, or "YR" for yellow-red, are used as symbols for the Hue names. When finer subdivisions are required, the ten Hue names, or symbols, may again be combined to produce such combinations as red-yellow-red, which is symbolized "R-YR". For even finer subdivisions, the Hues may be divided into ten steps each (1R to 10R and 1YR to 10YR), thus increasing the Hue notation to 100. Hence, the Hue notation of any color indicates its relation to the five principal and intermediate Hues or any of their subdivisions.

* * *

The value notation indicates the degree of lightness or darkness of a color in relation to a neutral gray scale, which extends from a theoretically pure black symbolized as 0/ to a theoretically pure white symbolized as 10/.

* * *

A gray or a chromatic color that apears visually half-way in lightness between pure black and pure white has a Value notation of 5/. Lighter colors are indicated by numbers ranging above five, while darker ones are indicated by numbers below five.

* * *

The Chroma notation of a color indicates the strength (saturation) or degree of departure of a particular Hue from a neutral gray of the same value. The scales of Chroma extend from /0 for a neutral gray out to /10, /12, /14, or farther, depending upon the strength or saturation of the individual color. A color classified popularly as "vermilion" might have a Chroma as strong as /12, while another color of the same Hue and Value classified popularly as "rose" might have a Chroma as weak as /4.

* * *

The complete Munsell notation for any chromatic color is written Hue Value/Chroma, or symbolically H V/C. A particular sample of vermilion might then have a Munsell notation of 5R 5/12, while a particular sample of rose might have a notation of 5R 5/4.

* * *

Whenever a finer division is needed for any of the three attributes, decimals may be used, such as 2.5R 4.5/2.4.

* * *

The notation for a neutral gray is written N V/. A very dark neutral (black) would be written N 1/0, and N 9/0 would be the notation for a very light neutral (white). For grays of slight chromaticity, the notation is written N V/(H,C), using only the symbols for the ten major Hues to indicate the Hue; thus a gray of a slightly yellowish appearance is written N 8/(Y 0.4).

* * *

The Munsell System of Color No-

tation can be thought of in terms of a color solid or color space in which the Value scale runs vertically from a theoretically pure black at the bottom to a theoretically pure white at the top, while the various Hues are located around it, describing an approximately cylindrical shape with the Neutral Value scale in its center. The Chroma scales radiate from the vertical Value scale in the center to the periphery of the color solid in equal visual steps (Figure 1).

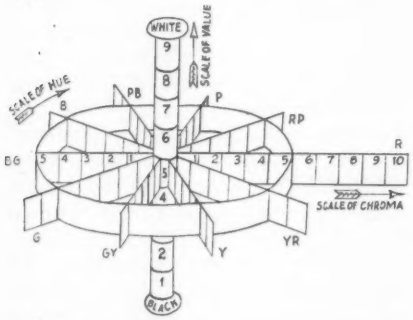


Figure 1—HUE, VALUE and CHROMA in their relation to one another. The circular band represents the HUES in their proper sequences. The upright center axis is the scale of VALUE. The paths pointing outward from the center show the steps of CHROMA, increasing in strength as indicated by the numerals

* * * * * * * *

Color Standards for Plastic Insulated Communication Cables and Wires

The REA color specification is written in terms of the Munsell Color System and specifies for each color a region in the three-dimensional Munsell color space depicted in Figure 1. For each color region the central color (centroid) and six tolerances are specified, two tolerances for each of the attributes of Hue, Value and Chroma. These tolerances represent the maximum permissible deviation from the centroid and are defined as follows:

Hue Plus (H+): Refer to the circular band of hues in Figure 1. The clockwise direction around this circuit, R, YR, Y, GY, G, etc., is the H+ direction. The H+ color represents the limit for hue deviation in the H+ direction from the centroid.

Hue Minus (H—): H— is the counterclockwise direction around the hue circuit. The H— color represents the limit for hue deviation in the H— direction from the centroid.

Value Plus (V+): V+ is the lightness tolerance and represents the limit for value deviation in the light direction.

Value Minue (V—): V— is the darkness tolerance and represents the limit for value deviation in the dark direction.

Chroma Plus (C+): C+ is the saturation tolerance and represents the limit for chroma deviation in the direction of increased saturation.

Chroma Minus (C—): C— is the weak or gray tolerance and represents the limit for chroma deviation in the direction of grayness or reduced saturation.

* * *

A typical color specification for a red color is as follows:

Centroid	**— 2.5R 4/12**
H+	**— 5R 4/12**
H—	**— 10RP 4/12**
V+	**— 2.5R 5/12**
V—	**— 2.5R 3/12**
C+	**— 2.5R 4/14**
C—	**— 2.5R 4/10**

* * *

..**Note** that in the case of each tolerance color two attributes remain constant with the centroid while the third attribute is varied. Fgure 2 shows these seven colors

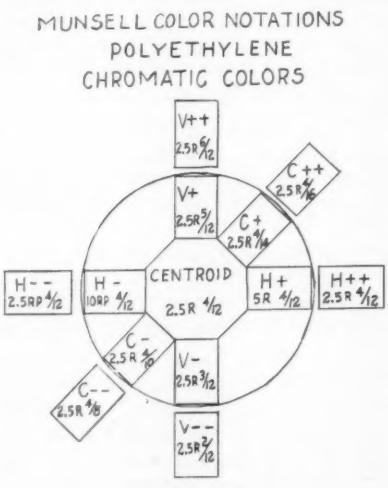


FIGURE 2.

arranged on a two dimensional chart in such a manner that each tolerance is juxtaposed to the centroid. An inspector comparing a sample color to this chart would proceed as follows:

1. **Compare the sample to the centroid. Is it darker or lighter? Assuming it to be lighter, compare it to the V+ color to determine if it is darker or lighter than this lightness limit. If it is lighter than the light limit (V+) it fails to meet the specification. If it is between the centroid and the light limit it meets the specification for value. If the sample were darker than the centroid, the same procedure would be followed with the V— color.**
2. **Again compare the sample to the centroid. Is it more saturated or more gray (Desaturated) than the centroid? Assuming it is more gray (desaturated) than the centroid, compare it to the C— color to determine if it is more gray than this gray limit. If it is more gray than this gray limit (C—) it fails to meet the specification. If it is between the centroid and the gray limit it meets the specification for chroma. If the sample were more saturated than the centroid the same procedure would be followed with the C+ color.**
3. **Again compare the sample to the centroid. Is is, in the case of a red sample, more red-purple or more yellow-red than the centroid? Assuming it is more yellow-red (orange) than the centroid, compare it to the H+ color to see if it is more yellow-red than this yellow-red limit. If it is more yellow-red than this limit, it fails to meet the specification. If it falls between the centroid and the yellow-red limit it meets the specification for hue. If it were on the red-purple side of the centroid the same procedure would be followed with H— color.**

* * *

The inspector has compared the sample to the centroid and determined how it differs from the centroid in terms of the visual attributes of hue, value and chroma. He has then compared the sample to the appropriate limits for these attributes to determine if it falls within these limits.

* * *

The usual situation is that the sample will not only differ from the centroid but will differ in all three attributes. However, because these differences are along visual parameters, the inspector can make independent color judgments for each attribute in order to determine compliance with the specification.

* * *

In addition to the seven acceptable colors, Figure 2 shows six unacceptable colors. Note that the acceptable colors are surrounded by a circle. All colors outside the circle are unacceptable colors. These six colors represent extensions of the various attributes beyond the permissible limits. These unacceptable colors are shown to assist the inspector in determining the position of his sample with reference to the centroid and the permissible limits. Colors that fall between the permissible limits and these unacceptable colors are, of course, unacceptable.

* * *

Neutral colors are those having no hue and little or no chromaticity. They have essentially only

value (lightness or darkness) and fall on the neutral value pole which runs from black to white in Figure 1. For these neutral colors a slightly different type of specification must be written. Any color deviation from a true neutral results in the color having hue and chroma, in addition to value. Tolerance specifications for neutrals are written in terms of permissible deviation from true neutral in any hue direction. Neutrals also have value tolerances.

* * *

A typical color specification for a neutral color is as follows:

Centroid — N 5/	Limits of Chromaticity —	5R 5/1
		5Y 5/1
V+	—N 6/	5G 5/1
V—	—N 4/	5B 5/1
		5P 5/1

* * *

The procedure for testing value limits in this case is the same as for the chromatic color. To test for compliance with the chromaticity limits, the sample is again compared to the centroid. It will usually deviate from the centroid toward one of the chromaticity limits, or in an angular direction intermediate to two adjacent limits. If it is visually between the centroid and these limits it meets the specification. If it is more saturated, and therefore more chromatic than these limits, it fails to meet the specification.

* * *

Figure 3 shows the above eight colors (N 5/ is duplicated) in their proper order. Note that the permissible colors are surrounded by a line. Outside this line are five additional chromatic colors on the right and two additional neutral colors on the left. These samples indicate colors which are beyond the permissible limits and which therefore have too large a deviation from the centroid to be acceptable. Such colors are included to permit the inspector more readily to determine the position of his sample with reference to the centroid and the permissible limits. Colors that fall between the permissible limits and these unacceptable colors are, of course, unacceptable.

* * *

Color standards conforming to

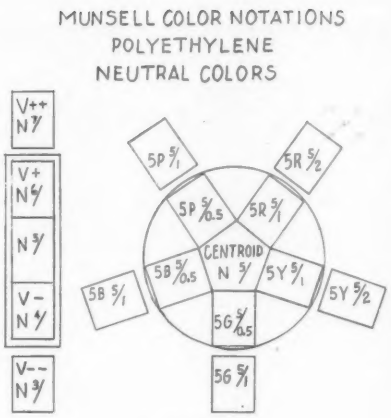


FIGURE 3.

the Munsell System of Color Notation are produced and distributed by the Munsell Color Company, Inc.* The principal form in which the Munsell colors are found is the MUNSELL BOOK OF COLOR which has been used in scientific and industrial color work for many years. Thousands of these books are currently in use and may be used for complying with the new REA color standard. However, for the REA standards the Munsell Color Company has designed a special series of color charts similar to Figures 2 and 3. These charts will display the appropriate colors in high gloss finish and will contain complete instructions for the use of the charts in complying with REA specifications. Also included will be information on illuminating and viewing conditions, scientific daylight light sources and color vision testing.

* * *

These charts will be available from the effective date of the REA specification.

Acknowledgements

Representatives of several manufacturers of wires and cables, plastics and colorant materials have cooperated with the authors and have played an important part in the development of these color standards.

* * *

In particular, the authors wish to thank Mr. W. J. Kiernan, Bell Telephone Laboratories, Mr. W. N. Hale, Munsell Color Company, Inc. and Mr. F. F. Farnsworth, former consultant to REA, for significant contributions in the development of these color standards and for their many helpful suggestions during the preparation of this paper.

*2441 North Calvert St., Baltimore 18, Md.

References

1. Even-Count Cables, F. W. Horn, *Bell Telephone Laboratories Record*, June 1959.
2. Colored Plastics for Wire and Cable, J. B. Howard and V. T. Wallder, *Bell Telephone Laboratories Record*, August 1959.
3. Design of Polyethylene Insulated Multipair Telephone Cable-Transactions, A. S. Windeler, *AIEE*, June 1959.
4. Transmission Properties of Polyethylene Insulated Telephone Cables at Voice and Carrier Frequencies, G. S. Eager, L. Jachimowicz, I. Kolodny and D. F. Robinson, *AIEE*, June 1959.
5. Color and Its Description, Dorothy Nickerson, *The American Ceramic Society*, Vo., 27, No. 2, February 1948.
6. Specifying Color By the Munsell System, *ASTM Designation D* 1535-58*T*, Issued 1958.

If you borrowed this copy of WIRE and WIRE PRODUCTS from someone . . .

Please fill out the coupon below and return it so that you can have your own.

WIRE AND WIRE PRODUCTS
453 Main St., Stamford, Conn.

Please enter my subscription for one year starting with the next issue.

Name: .....
Company: .....
Street: .....
City: .....

☐ Check enclosed. ☐ Bill me.

USA, Canada and Mexico ..... $ 8.00/yr.
Foreign subscription ..... $10.50/yr.

New Galvanizing Department at Gilbert & Bennett's Blue Island, Illinois, Plant

A unique application of radiant tube heating, galvanizing, and lead settings.

An installation has recently been completed for galvanizing and preannealing of steel wire of 16 to 12 gauges for an hourly yield of 2400 pounds in twelve strands and at a speed of 25 F.P.M. at the Blue Island plant of Gilbert & Bennett Manufacturing Company for preparing wire for woven and welded wire fabrics.

* * *

This plant, originally built in the middle 1800's and acquired by Gilbert & Bennett in 1885, is hardly recognizable after the rebuilding program undertaken over the last several years, which has involved a new annealing department, new fabric welding equipment and now this installation for continuous wire galvanizing.

* * *

Fig. 1 is a general view of the entire installation which was made in a new building wing. The wire is brought from the drawing machines on pipe spiders and paid off to guides by an ingenious mechanical device that prevents the wire from kinking. The twelve strands of wire are then guided to the lead bath where they are heated to temperatures of 1300 deg. F. and then leave the bath to be guided in a rectangular loop back through an acid cleaning tank, a washing tank and then to the galvanizing setting.

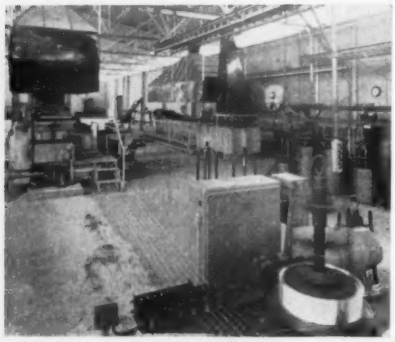


Figure 1—General view of the installation.

The wire leaves the galvanizing pot through a wipe, and then passes over a lubricating roll to the take-up blocks, of which there are twelve in a row.

* * *

With fuel and gas collecting hoods over all units, the processing room is entirely free from smoke and fumes.

* * *

The unique heat application involved is developed in two Lee Wilson radiant tube heating settings. Figure 2 shows the lead annealing setting. In this setting, straight alloy radiant tubes are placed below the pan from either side. The combustion takes place entirely within the radiant tube and there is no direct flame contact on the bottom of the pan.

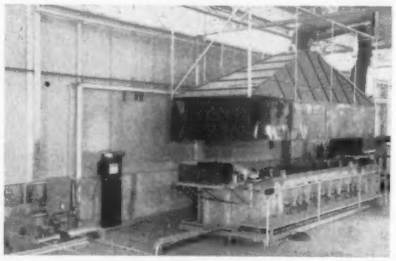


Figure 2—Lead annealing setting. * * *

The actual method of tube application is seen in Figure 3. This tube arrangement results in an unbelievably low combustion chamber temperature to produce the heating effect required.

* * *

In Figure 2 the combustion control chamber is shown adjacent to the temperature control panel. On this unit is mounted the combustion air blower, temperature control valve and drive motor, safety valve, pressure switches, manometer, and the over-all master control panel through which all of the safety functions, including a high temperature limit in the control instrument, are interlocked.

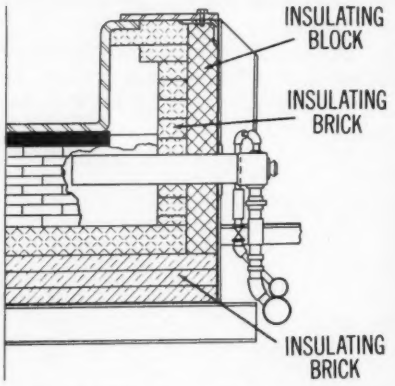


Figure 3—Burner layout for the lead pan setting. * * * * * * * * * *

This unit was completely assembled in the Lee Wilson plant, as was the lead setting, with the exception of the lining which was installed in the field.

* * *

Figure 4 is a close-up view of the galvanizing setting which is heated with a radiant elbow application shown in Figure 5. Here again all of the combustion is completed within the alloy elbow and heat is transferred to the pot by radiation. The sensible heat in the combustion gases still wipes along the pot surface, but there is no direct flame impingement and it is expected that ordinary pot life will be doubled and the amount of drossage cut in half.

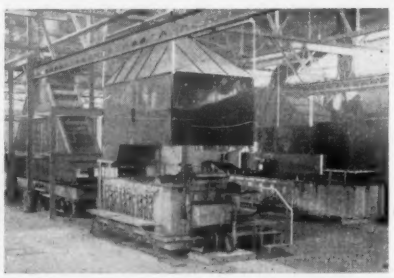


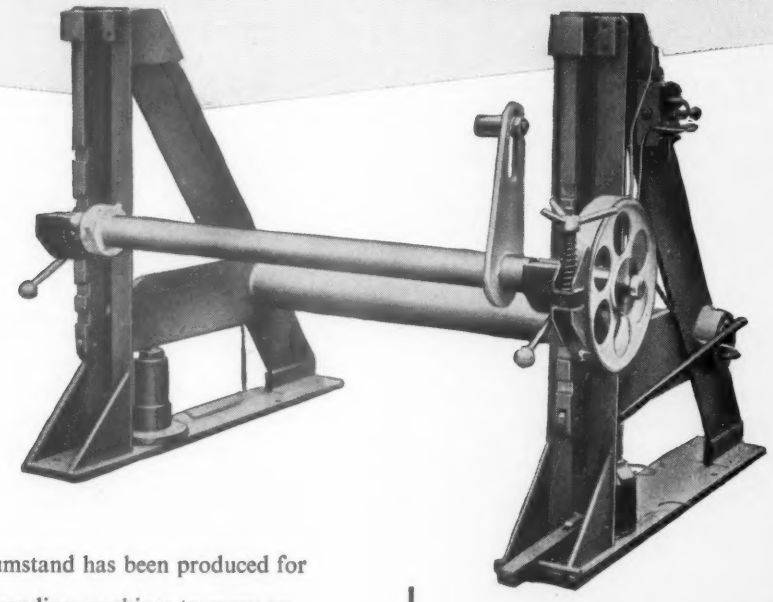
Figure 4—Close-up of galvanizing setting. *

Some data on the permissible heat transfers with this system may be interesting.

(*Please turn to page* 388)

THE *NEW*

HYDRAULIC PAY-OUT DRUMSTAND



The new LB Hydraulic Pay-Out Drumstand has been produced for quick adaptation for use with any stranding machines to carry an additional stranded core or lead-in wire. It is ideal for extruding lines. All loading operations have been simplified. The support bearings carrying the through shaft are easily positioned ready for lifting the drum clear of the floor. Hydraulic jacks do the lifting and lowering. The tensioning device is independent of the through shaft to avoid constant dismantling. The Drumstand is made in five standard sizes to meet a variety of drum diameters up to 10 feet and weights to 10 tons. To increase the diversity of application each stand is supplied with two shafts of differing diameters.

designers and manufacturers of machines for electric cable wire rope and soft rope production

LARMUTH & BULMER LIMITED

In association with Mono Pumps Ltd. J. & E. Arnfield Ltd. Menrow Ltd. Carlisle Electrical Co. Ltd.

Sales Office: 58 WHITWORTH STREET, MANCHESTER, ENGLAND

Telephone numbers: CENTRAL 6711/2/3

Agents in South Africa: Mono Pumps (Africa) (Pty) Limited, Audenshaw House, Wendall Street, Lakeview, Johannesburg. Telephone: 33-1112/3
Agents in Australia: Mono Pumps Limited, Mono House, 132 Burwood Road, Burwood, E.13, Melbourne, Victoria. Telephone: BW. 0291
Agents in Canada: The E.V. Larson Company Limited, 572 Queen Street, East, Toronto 2, Ontario. Telephone: Empire 4-2111

LB.8

Stiffness Factor: A Quality Control Measurement for Wire

by N. W. Roberts
Process Development Laboratory
General Electric Company
Pittsfield, Massachusetts

Stress analysis as a means of assuring the production of better products is a practical measure, as this article indicates.

The measurement of the hardness of copper wire has been a controversial subject for many years. The conventional hardness measurement procedures and equipment have their limitations and do not yield a large numerical difference between soft and hard wire. During more recent years the wire industry has advanced the belief that wire consumers are more interested in the ease with which wire can be handled and bent to shape and retain its shape. Consequently, new test procedures have been evolved; one which tests the tensile properties of the wire, and another the springback test. Although these tests procedures are still widely used, the results are not reproducible and are quite coarse.

* * *

The General Electric Company Transformer Wire Section produces copper wire which varies in size, shape (rectangular and round) and type of insulation. These factors are governed by the department (Power or Distribution) which uses the product. The wire produced, bare wire wrapped with paper and/or cotton insulation or Formex* wire, calls for different manufacturing methods. Either method calls for steps of rolling, drawing the wire to size, annealing, and insulation application as the wire is passed over several sheaves. All of these operations have their adverse effect on the finished wire's degree of temper or hardness and have to be taken into account by any quality control instrument that is used in the wire's final inspection.

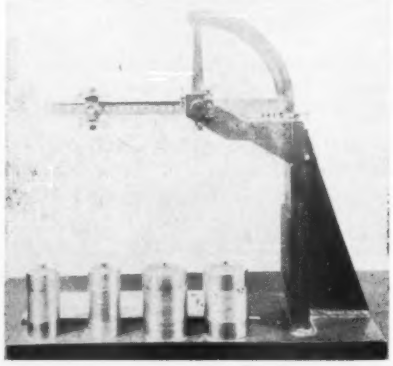
* * *

The possibility of using one of the hardness testers available on the market proved impractical for the following reasons:

1. **The range of wire manufactured was too great, the ribbon type of wire was too thin for the penetrator.**
2. **Round wire could not be tested.**
3. **The Formex insulated wire could not be tested without first removing the Formex. The grinding or scraping of the wire to remove this insulation surface hardens the wire thereby giving erroneous hardness readings.**
4. **The testers did not yield a large numerical difference between soft and hard wire.**

* * *

As stated above, the primary reason for desiring soft copper wire is the ease with which it can be handled and bent to shape and retain its shape. This depends on the stiffness of the wire. It was therefore decided to use this mechanical property of wire to evaluate its degree of temper. There being no commercial instrument available to handle our specific problem, we designed, built and evaluated the wire stiffness tester shown in photograph. A.S.T.M. B113-41 was



Wire stiffness tester used for quality control of rectangular wire. * * * * * *

used as a guide for designing the unit. At about this time an article appeared in the September 1953 issue of **Wire and Wire Products** entitled "Proposed New Scales for Expressing the Stiffness of Round and Flattened Wire." Messrs. J. M. Thomas and L. Thomasson presented in their article two empirical expressions for the stiffness of round and rectangular wire.

Rectangular Wire:

$$S_r = \frac{\sqrt{\frac{\text{TORQUE}}{\text{WIDTH}\sqrt[3]{\text{DEGREE BEND}}}}}{\text{THICKNESS}}$$

Round Wire:

$$S_w = \frac{\sqrt[3]{\frac{\text{TORQUE}}{\sqrt[3]{\text{DEGREE BEND}}}}}{\text{DIAMETER}}$$

* * *

Their investigation showed that for any wire of uniform temper and cross section the factor

$$\frac{\text{TORQUE}}{\sqrt[3]{\text{DEGREE BEND}}}$$

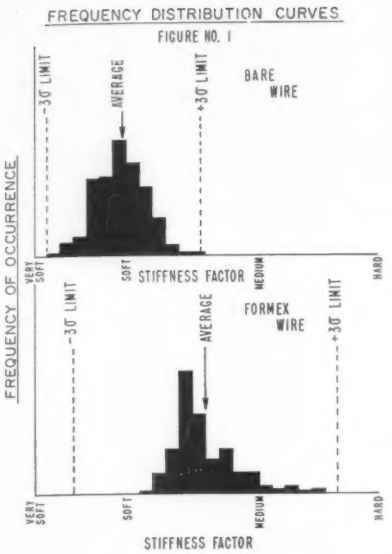
is constant and the stiffness factor was independent of wire size. These facts were verified with our tester by a long range program set up with the wire section. All tests were conducted on copper wire as follows:

1. **Five bare wire samples were selected at random after anneal each day over a three-month period and tested for stiffness.**
2. **Two-film coated wire samples were selected from each coating oven daily for over a month and tested for stiffness.**

* * *

The statistical interpretation of the results obtained for the tests are shown in the frequency distribution curves, Figure 1, for rectangular wire. It was established that dead soft wire has an S_r value of 30 and full hard an S_r value of 70. The computation of the S_r number is greatly facilitated by the use

*Registered Trade Mark of General Electric Company.



of a slide rule with special scales specifically designed for this purpose.

* * *

After these tests, it was decided that more tests should be conducted even though the earlier program had been sufficient to verify the stiffness tester's accuracy and adaptability as a quality control instrument. The study recently completed on copper wire was to determine the following relationships:

1. Establish a correlation between "Wire Stiffness Factor" and "Rockwell Hardness."

2. To determine the energy required to be applied to various size wire.

* * *

This information would place a variance of ±1 on all stiffness values and establish an equation for comparison of stiffness and hardness.

* * *

The first factor was studied for the following wire sizes: 0.325" x 0.085", 0.325" x 0.107", 0.268" x 0.117", 0.440" x 0.120" and 0.300" x 0.132". It was felt that any thinner wire would not give true hardness measurements.

The second factor was studied for two sizes of wire 0.140" x 0.115" and 0.485" x 0.130".

* * *

In both tests the copper wire was received in its hardened state with no anneal. Samples were placed in an oven and the anneal temperatures controlled to obtain different degrees of tempered wire.

* * *

The tests showed, Figure 2, that a linear relationship does exist between stiffness and hardness. The average curve for all sizes of wire studied came out to be:

$$H = 1.54\ S_r - 8.5$$

where H = **Rockwell Hardness**

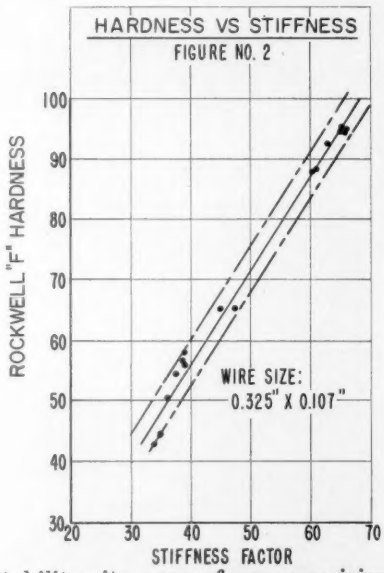
and S_r = **Stiffness Factor**

* * *

The second factor studied showed that all tests should have sufficient torque applied such that the degrees of bend reading falls in the range of 40 to 55 degrees. This places the variance of ±1 on all stiffness factors calculated. The results for 0.140" x 0.115" wire is shown in Figure 3.

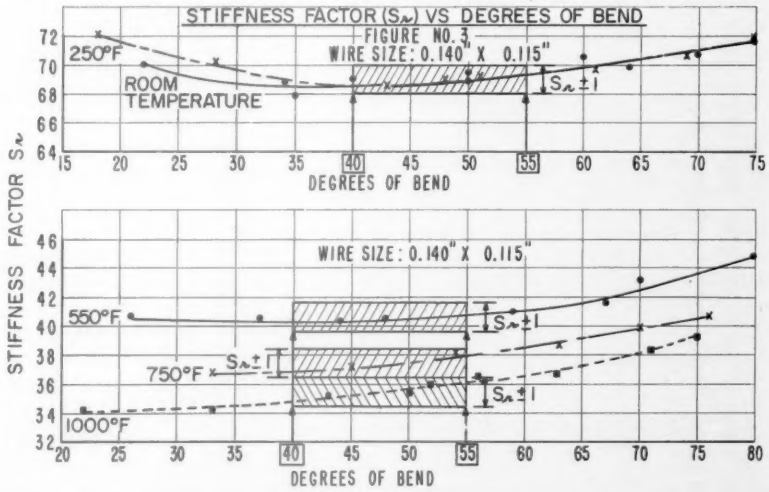
* * *

The wire stiffness tester was introduced to production on March 1955 based on data indicating its excellent reliability and reproducibility, its ease of use, precision and applicability as a quality control measurement for wire. The tester has been very favorably accepted by both wire manufacturing and inspection.



* * *

The author is indebted to two of his co-workers: **William M. Pafenbach, Jr.** who worked on the design of the stiffness tester and the test program, and **Lyance G. Littlejohn, Jr.**, who designed the special slide rule.



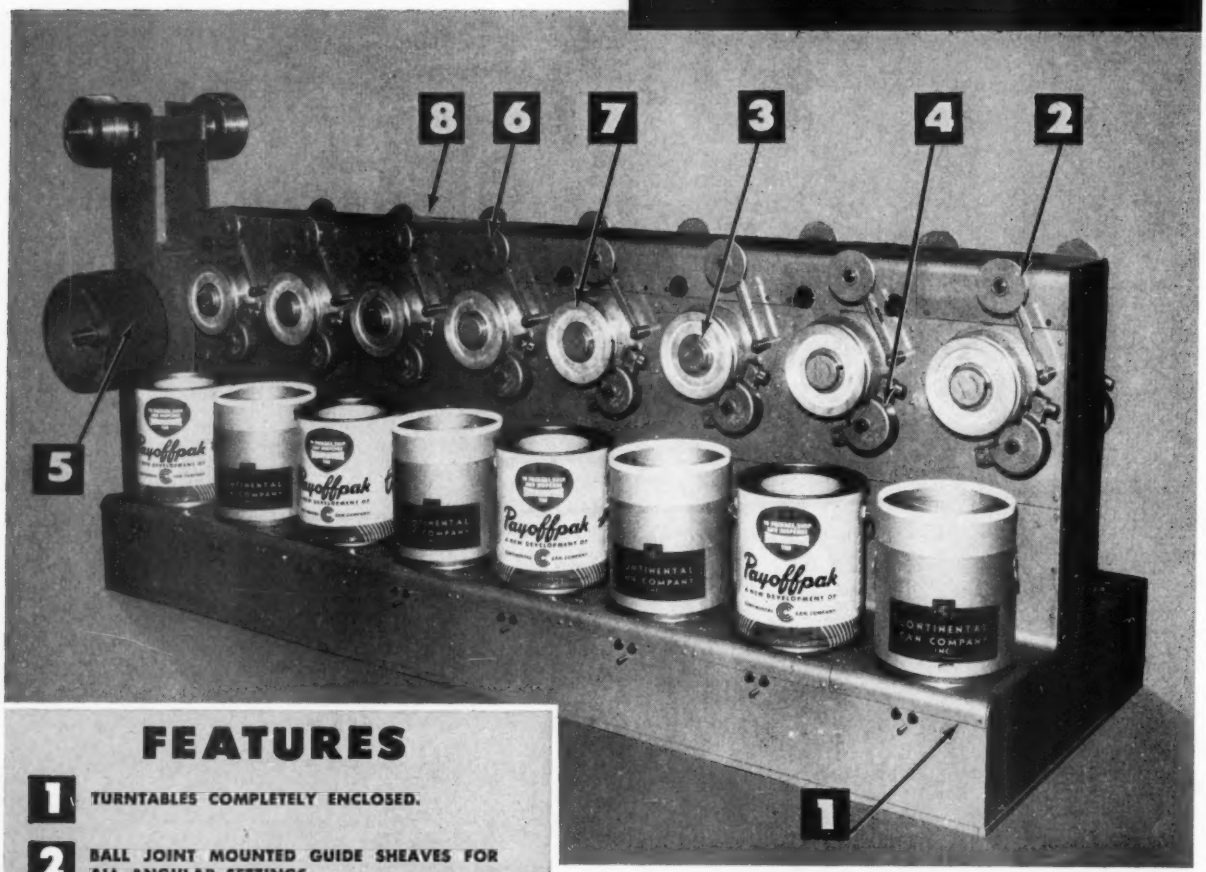
THE WIRE ASSOCIATION

invites wire men to join the organization and participate in its activites.
Write for a booklet on what it is and how it functions to

RICHARD E. BROWN
Executive Secretary

453 MAIN STREET — STAMFORD, CONN.

ANNOUNCING the WYREPAK



FEATURES

1. TURNTABLES COMPLETELY ENCLOSED.
2. BALL JOINT MOUNTED GUIDE SHEAVES FOR ALL ANGULAR SETTINGS.
3. ELECTRO-MECHANICAL TENSION CONTROL FOR EACH HEAD.
4. PRECISION GROUND PRESSURE ROLLS.
5. PRIME RUBBER LAGGED CAPSTAN.
6. ASSEMBLED AND ALL ADJUSTMENTS MADE WITH ALLEN SCREWS.
7. ALUMINUM CAPSTANS, WITH HARD-ANODIZED, POLISHED RUNNING SURFACES.
8. INDIVIDUAL MAINTENANCE ON EACH SECTION.

The drum packaging Take-Up System illustrated, Model S5-TC-S, was designed especially for Magnet Wire.

Other models are made for all types of ferrous and non-ferrous wires.

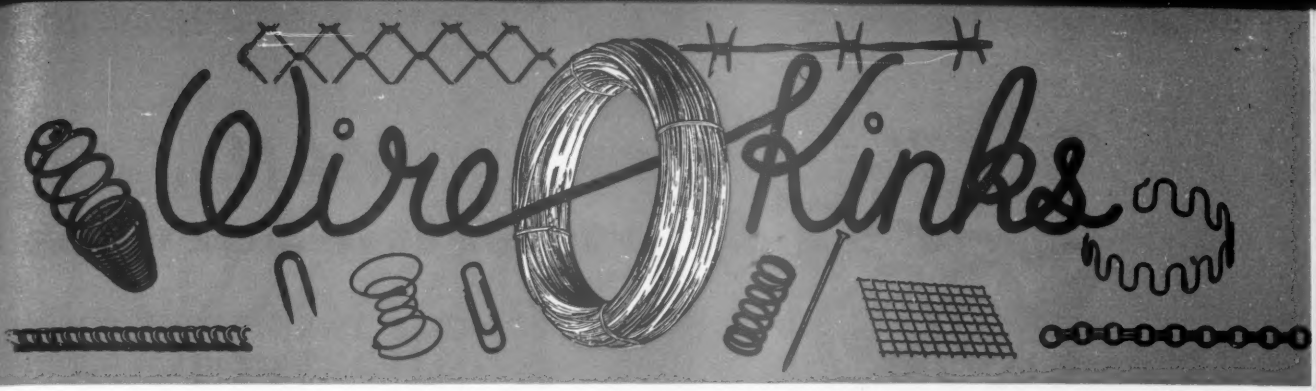
Advanced engineering and precision construction have evolved in this machine new concepts of speed and efficiency in the packaging of wire. Capacity: Min. size — #32 ga.; max. size — #20 ga. wire.

YOU ARE INVITED TO SECURE COMPLETE DETAILS REGARDING THIS ADVANCED PROCESS FROM —

Advanced Wyrepak Co., Inc.

11 HARRISON COURT PHONE: EDison 4-4274 BRIDGEPORT, CONN.

OR The Vaughn Machinery Co., CUYAHOGA FALLS, OHIO



In this department will be published helpful hints on how to do things and the questions asked by our readers on wire processing problems, together with the answers and comments thereon received from the field. In no instance will the identity of the persons asking for advice or of those supplying it be published.

Our readers are invited to send helpful contributions and to submit questions on their technical problems to the Editor. These will be answered from information on hand or from the field, when it becomes necessary to secure counsel from that source.

Handling Breaks in Fine Copper Wire

Question

In the article "Inclined Enameling Machines for Coating Fine Gage Wires" in your October, 1958, issue appears the following paragraph:

> "Head assignment per operator varies from 96 to 144 depending on wire gage and size of take-up spools. Operators are concerned only with changing spools (both take-up and supply), making distributor adjustments to secure level winding, repairing wire breaks, and adding fresh enamel to the machines."

* * *

We would like to know what welding equipment is available for welding these fine gage wires, or does a wire break mean re-threading the machine? Who supplies such fine wire welding equipment?

Answer

We do not weld or braze when a wire breaks or even when a new supply spool of bare wire is started. A broken wire calls for a partial to complete rethreading job depending on where the break occurred. To replenish the bare wire supply, the old spool is stopped just before it is used up and the wire from the new spool attached to the old wire by a twisted splice. In either case, (broken wire or new supply spool), a new take-up spool is put in place. The relatively small amount of wire that has become burned by standing in the oven while the wire was stopped is pulled through by hand and discarded before the new take-up spool is started. The twisted splice is also included in the discarded wire.

* * *

Some information on the questions asked is given on Page 83 of the January issue of Wire and Wire Products in the discussions on this particular paper.

Depolarizing Agents In Pickling

Question

Can you explain what is meant by the term "depolarizing agent" and its function in pickling operaitons?

Answer

When steel is placed in an acid pickling solution the electrolytic corrosion calls begin to function. Metal ions go into solution at the anodic centers, while the cathodic areas are protected from such solution, since in these areas hydrogen is evolved, which tends to cling to the surface and, insofar as it does, it retards the rate of corrosion or flow of current. This is called "cathodic polarization."

* * *

Cathodic areas of such cells become anodic in relation to the charges of nearby cathodic areas of greater charge and the physical position of the corrosion cells shift about, resulting in an uneven attack of the metal surface.

* * *

A fundamental upon which the work of depolarizing agents is based is that in an acid phase process of preparing steel surfaces for cold working by pickling, the attack upon the metal by the etching acid is never uniform. Whatever improves this condition should have practical advantages.

* * *

Both oxygen and ferric salts are good depolarizing agents and are present in every sulfuric acid pickling solution. Other agents, metallo-organic in nature, are even more efficient. One of these, produced under the name of "Azed", is said to permit greater speed of pickling, allow the use of lower acid concentrations, produce a smoother surface, and result in less metal loss.

* * *

Cathodic depolarization is not considered a cure-all. Its possible value in any given operation can only be determined by a survey of opreating conditions and mill requirements.

Lubricant Filtration

Question

Will you state some of the reasons why filtration of wire drawing lubricants is considered desirable?

Answer

In the wet drawing of wire, it is not hard to imagine that the lubricant can become contaminated with metal particles and foreign substances in a relatively short period of time, reducing the effectiveness of the lubrication and shortening die life.

* * *

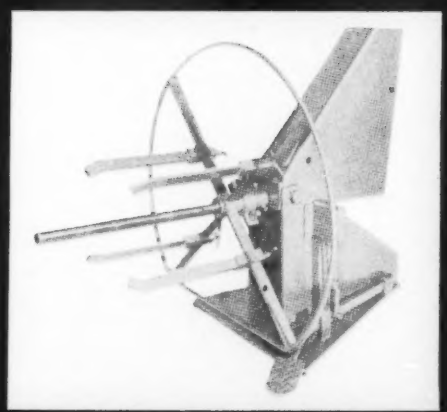
The answer is a good filtration

The Wire Machinery MAN . . .

Starts With Service

BE WISE

"Buy quality and service when you equip your plant. We offer selected-proven machinery to meet the Wire Industry's needs"



LARGE AND SMALL TILT REELS

A PERFECT MACHINE — LARGE WORKING TABLE — ONLY 3 MOVING PARTS EASY SET-UP — FAST

7 TYPES OF BENDERS

ONE MAN LOADING — 350 POUND COILS — FULL BRAKE — SAFETY — FAST

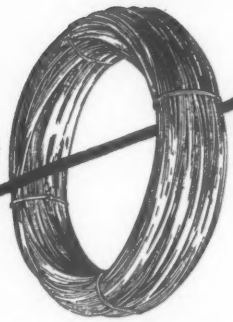
5 More Exclusive Machines

- WIRE STRAIGHTENERS AND CUTTERS
- THREAD ROLLING EQUIPMENT
- DEAD BLOCKS
- WIRE DRAWING AND MECHANICAL DESCALING
- RE-BUILT WIRE MACHINERY

Wire Machinery Inc.

5407 SOUTH KNOX AVE. CHICAGO 32, ILLINOIS
POrtsmouth 7-2508

Wire Kinks



system. One mill drawing high alloy wires to fine sizes with an expensive oil as a lubricant found that after two years of use the original batch of oil, except for occasional additions to compensate for dragout, was crystal clear. The filtering elements were changed every one to two months at a cost of about $10.00 for filtering materials. During the change machines were not stopped, since the system was equipped with a bypass that allows the circulation to continue during the two-hour replacement period.

* * *

While filtration is important in drawing stainless steel, nickel-chrome and other alloys, it is even more important in drawing soft metals like copper, in which metal slivers are more readily produced to contaminate the soap solution. It has been generally considered that drawing copper is harder on die life (diamond dies in the fine wire sizes), but proper filtration, coupled with a heat exchanger to bring the slurry temperature to a correct point when starting up, will solve most of the old problems.

Wire Drawing Computations

Question

I was much interested in an article that you published in your May, 1958, issue. It was entitled "Graphical Computations for Wire Drawing Machine Characteristics."

* * *

Under Nomogram A is a phrase: "Area Reduction in CM". I would be grateful if you would explain the relationship between CM and MM and state the distance between two units of AWG.

It would also be helpful if you could include the equivalent number in MM of the expression: $(D^2—d^2) = 9000$.

* * *

Also, have similar nomograms been prepared for steel wire, as copper and aluminum have been treated in the article?

Answer

I feel the following information will convey to your correspondent in Italy the relationship between our American system vs. the European system of wire measurement.

* * *

The AWG size of a wire refers to a gage member determined from a geometric series of diameters where each element of the series is numbered in order starting with 4/0 or 0000 through any value (n) considered a minimum.

* * *

This series is expressed mathematically as follows:

AWG	Diameter in Inches = d
4/0	$.460(.8905)^0$
3/0	$.460(.8905)^1$
2/0	$.460(.8905)^2$
1/0	$.460(.8905)^3$
1	$.460(.8905)^4$
2	$.460(.8905)^5$
through	
n	$.460(.8905)^{n+3}$

* * *

The CM referred to is Circular Mils which by definition is the square of the diameter expressed in thousandths of one inch

$$(d \text{ (inches)} \times 10^3)^2 = CM$$

* * *

The European system expresses the diameter of the wire in millimeters (mm)

$$d \text{ (inches)} \times 25.4 = d(mm)$$

or

$$d(mm) \times .03937 = d(inches)$$

* * *

To convert from mm diameter to CM (area in Circular Mils)

$$CM = (39.37d(mm))^2$$

or

$$d(mm) = \frac{CM}{39.37}$$

* * *

Unfortunately, it is impossible to convert directly a difference in area formula such as $(D^2—d^2) = 9000$ and express that difference in mm; it must rather be expressed in square mm:

9000 CM area reduction is equivalent to 4.6 square millimeters area reduction.

* * *

It must be recognized that this figure, since it represents the difference in area between the circles, cannot be represented as a specific diameter.

* * *

We might add another definition of circular mils:

Measure of cross section of wires; area of a circle whose diameter is one mil; 0.7854×10^{-6} square mil.

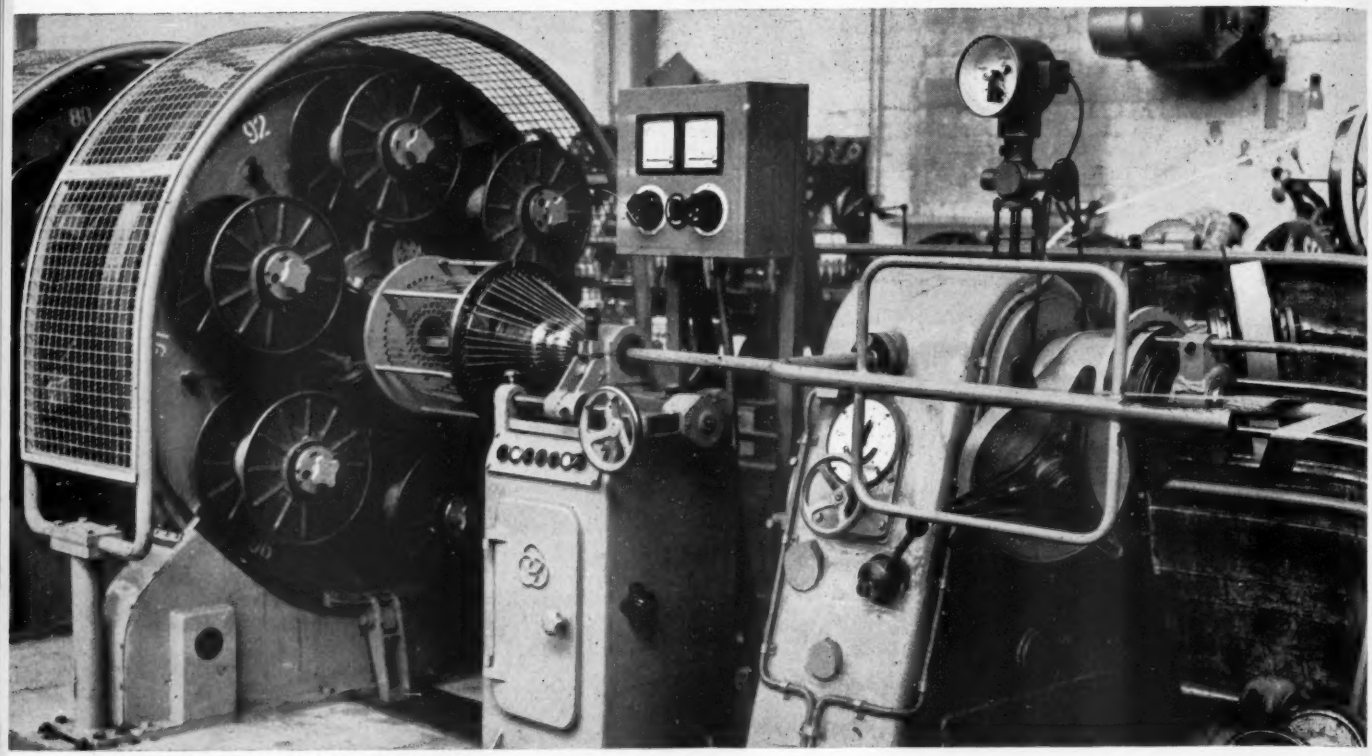
Conversion Factors

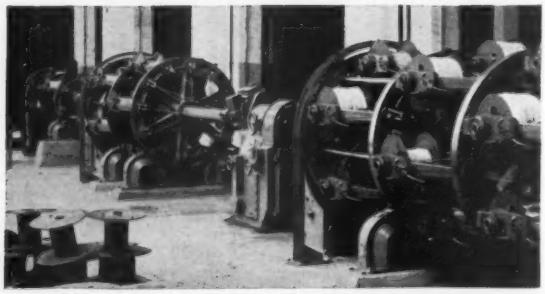
To convert	multiply by
CM to Sq. in.	.0000007854
CM to Sq. mm.	.0005066

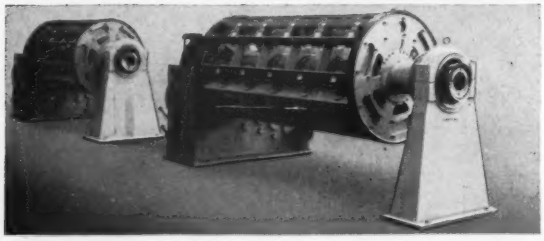
* * *

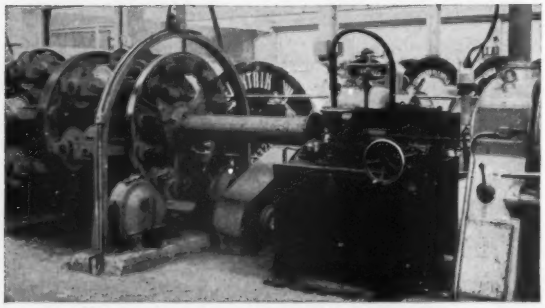
So far as we know similar nomograms have not been prepared for steel wires, so that we are unable to refer you to a source for them. The CM measurement is only used in connection with conductor wires.

KRUPP









Cage Stranding Machines for Power Cables

Top:
Planetary strander arranged for back twisting

Left, top:
Rigid frame strander with concentric bobbin arrangement

Left, center:
Rigid frame rotor with tangential in-line bobbin arrangement

Left, bottom:
Planetary wire armoring machine with bobbins arranged for back twisting

FRIED. KRUPP MASCHINEN- UND STAHLBAU RHEINHAUSEN

For information, please contact Krupp International Inc., 375 Park Avenue, New York 22 N. Y.

You Are Cordially Invited to Attend

THE SPRING REGIONAL MEETING
of
THE ELECTRIC WIRE & CABLE SECTION
THE WIRE ASSOCIATION

MAY 4 & 5, 1960 — SHERATON HOTEL — PHILADELPHIA, PA.

PROGRAM SCHEDULE

WEDNESDAY MORNING — MAY 4TH

9:00 A.M. — Registration of Members, Guests and Ladies
10:00 A.M. — Electric Wire & Cable Committee Meeting (Connie Mack Room)
10:30 A.M. — Ladies' Coffee Hour
12:00 Noon — Committee Luncheon for Program Participants (Constitution Room)

WEDNESDAY AFTERNOON — MAY 4TH

1:45 P.M. — Welcome by Allan B. Dove, Association President (Pennsylvania Room)
2:00 P.M. — Technical Session (Pennsylvania Room)
6:00-7:00 P.M. — Hospitality Hour — Ladies are invited (Constitution Room)

THURSDAY MORNING — MAY 5TH

9:00 A.M. — Technical Session (Pennsylvania Room)
10:00 A.M. — Ladies leave for tour of Longwood Gardens, with luncheon at the du Pont Country Club, Wilmington, Del., returning to the hotel at approximately 2:30 P.M.

THURSDAY AFTERNOON — MAY 5TH

1:00 P.M. — Visit to the Copper, Tubing and Conduit Divisions of Walker Brothers in Conshohocken, Pa. Transportation will be by bus only. Busses will return to the hotel by approximately 4:30 P.M. Late check-out, 7:00 P.M., has been arranged with the hotel for all attending the Regional Meeting.

WATCH FOR FURTHER PROGRAM DETAILS

**Association members will receive hotel reservation cards by mail.
Others desiring to attend may write for them.**

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 MAIN STREET **STAMFORD, CONN.**

Realock Fence Encloses "Pioneer Village"

The line between "Pioneer Village," the Denver Civic Center replica of life in the West in 1859, and the thriving metropolis of 1959 around it is a strong one — a Realock Fence made by **The Colorado Fuel & Iron Corporation.**

* * *

The "Village," part of the Colorado Centennial Celebration, needs its fence to channel in and out the many visitors who come to see "life in 1859." It has an old time city hall, livery stable, assay office, drug store, trading post, Wells Fargo office with a real stage coach, Spanish Trails curio shop, Ye Soda Shoppe, newspaper office, Tin-Type photographer, and Tonsorial Palace.

* * *

Other exhibits are the Indian village, with real live dancing Indians; an amazing gun collection in the gunsmith shop; a bank, complete with holdups and gunfights in the street, plus a cashier who sells money that can't be spent; a post office with special cancellation service; a hotel; and a couple of authentic "Faro" dealers.

Water Detection Device for Oil Quench Tanks

The presence of water in oil quenching tanks is one of the greater hazards to a safe operating schedule. As a means of promoting safer quenching practices, an automatic water monitoring device known as the Ipsen Water Sentinel is announced by **Ipsen Industries, Inc.**, Rockford, Illinois. It is designed for the detection of water in an enclosed type oil quenching tank used in heat treating operations.

* * *

If moisture in excess of 0.15% is permitted to accumulate at the bottom of an oil filled tank, or to emulsify in rapidly circulating oil, the possibility of steam formation upon quenching a hot charge within the oil-water mixture becomes acute. The internal expansion can cause foaming, and the 1700:1 volumetric expansion of water vapor within the oil can swell the entire volume beyond the limits of the quench tank. This can result, not only in interrupted production, but can also cause extensive damage to equipment.

* * *

Water may enter the quench oil system from several sources: (a) condensation on cold enclosure walls from high dewpoint atmospheres; (b) failure of water carrying mechanisms within the oil tank; (c) careless introduction of water contaminated oil from a storage or reservoir system.

* * *

The continuously monitoring detector, or "Sentinel," consists of a detecting probe immersed in the oil, and sealed in the tank. The heart of the "Sentinel" is a replaceable resistor sensitive to water. This resistor changes its electrical resistance in the order of 5:1 when subjected to emulsion-moisture in excess of 0.1%. This relatively great change permits safe triggering of the alarm system. An audible or visual alarm oper-

LEGEND LARGE AND CLEAR ON INSULATED WIRE SURFACES — USE GILLIES MARKING

GILLIES CONCAVE AND FLAT MARKING WHEELS PRINT YOUR

WHEELS AND MACHINES FOR BEST WIRE IDENTIFICATION

MARKING WHEELS and MACHINES for ELECTRIC WIRE

THE BEAUTIFUL TOWN OF WEST BOYLSTON, MASSACHUSETTS WELCOMES INDUSTRY. INQUIRE FROM US.

Gillies Engraved Concave and flat marking wheels are widely used printing the I.P.C.E.A. color code, numerical, semi-spiral striped, dating, or manufacturer's identification, etc. on insulated wire, tubing or hose.

Machines print on ONE or BOTH SIDES in large legible letters. Wheels are adaptable to any machine—or we will supply the machines.

Wheels, shafts, ink pans and all accessories are readily removable for quick and easy cleaning.

Wheels are made of TOOL STEEL, HARDENED to Rockwell test 61-64 and HARD CHROME PLATED.

Send for samples of wire and prices on wheels and equipment.

U. S. Patent #2898848 & 2898849

"There is no substitute for QUALITY when combined with SERVICE"

DUNCAN M. GILLIES CO., INC.

P. O. BOX 181, WEST BOYLSTON, MASS.

Telephone: TE 5-4445

ates immediately, or the "Sentinel" is made to act as an automatic shut-off device.

Motion-Control Sheave

Wood's new "MCS" variable-speed sheave is designed to hold a constant driven speed during changing torque loads. A further advantage is the absence of freezing. No matter how long the sheave has been running at a set speed, it will not stick when the speed is changed. Maintenance is reduced almost to the vanishing point: the oil reservoir requires checking only once or twice a year.

* * *

The "MCS" drive sheave is offered in two sizes. MCS-10-W, for motors of 7½ to 15 hp, has a minimum pitch diameter of 5.0 inches, a maximum pitch diameter of 10.0 inches. MCS-12-W, for motors of 15 to 20 hp, has a minimum pitch diameter of 6.0 inches, and maximum pitch diameter of 12.0 inches. Companion sheaves equipped with Wood's demountable "Sure-Grip" bushings are available in 24 diameters ranging from 8 to 40 inches. For additional details, write **T. B. Wood's Sons Co.**, Chambersburg, Pa.

New Plastic Spool Cuts Deposit

A new plastic spool now in use at Alloy Metal Wire Works, **Riverside-Alloy Metal Division, H. K. Porter Company, Inc.,** has cut the customer deposit required. Easier to handle than metal spools, the new put-up is used for weaving wire.

* * *

The attractive yellow spool has made possible a 73% reduction in the deposit. Users of five pound metal spools formerly paid a $1.50 deposit on each spool. The new spools involve 40c. The fact that no equipment changes are necessary to handle the plastic spools has made them more attractive to many wire weavers.

* * *

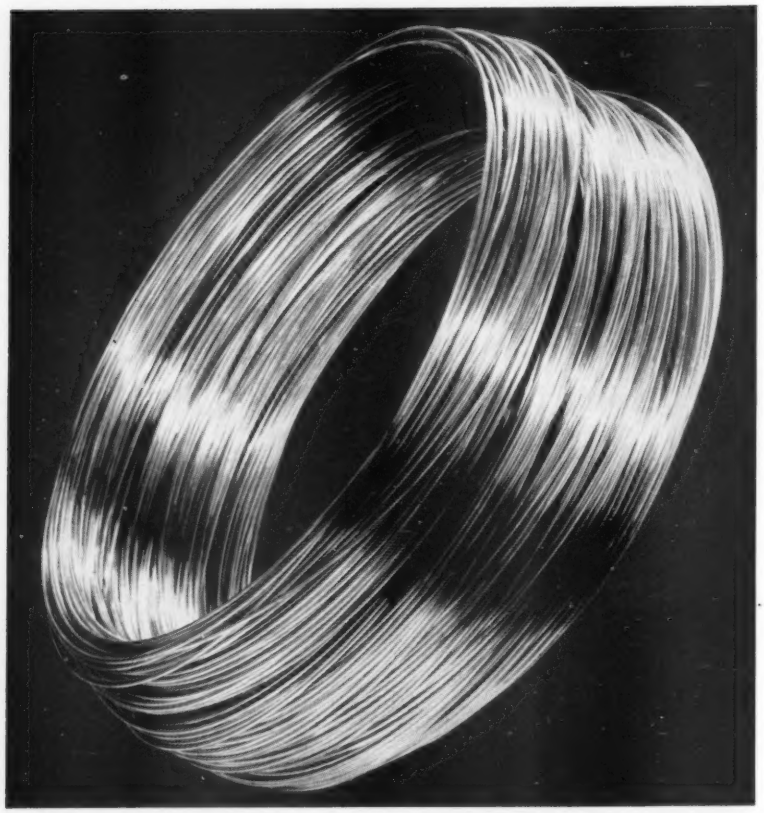
Adopted on a limited scale last March, the plastic spools proved to be satisfactory in every way. They are used as a five-pound put-up on Almet Stainless Steel, Monel, Nickel, Inconel and many other al-

ACOUSTICA ULTRASONIC CLEANING CUTS COSTS!

Much better cleaning!
Much less time!

In seconds—all dirt, dust, and soils are "cavitated" away *ultrasonically!* No scrubbing, no disassembling, no costly maintenance. Hard-to-get-at parts are cleaned swiftly and thoroughly. Modern Acoustica ultrasonic cleaning is rapidly replacing older methods. Send for details of complete line of Acoustica ultrasonic equipment and cleaning chemicals. Acoustica Associates, Inc., Fairchild Court, Plainview, N. Y. • 1042 Aviation Blvd., Los Angeles, Calif.

acoustica
ULTRASONIC CLEANING SYSTEMS



from CONTINENTAL
a lustrous new

TINNED WIRE

Here's smoothness and luster you rarely get in tinned wire. Continental's special technique makes possible an enduring, uniformly bright finish . . . a wire so bright that it can replace plated wire on many products. It retains its brightness for long periods of time in normal use. Continental tinned wire meets your needs for quality and workability and is available in almost any temper and analysis in medium low carbon and low carbon steels.

FINE—16 gauge through 30 gauge, in 8" diameter coils
COARSE—20 gauge through 5/16", in 16" and 22" diameter coils.

For smooth beauty and high degree of perfection in wire, you will want to investigate Continental Tinned Wire. Write or Telephone—today; or return coupon below.

FILL OUT AND RETURN COUPON TODAY

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

☐ Send Complete Details ☐ Have Salesman Call

CONTINENTAL STEEL
CORPORATION · KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

loys. While used primarily for weaving wire, the new spools have also been used for other wire of soft temper.

* * *

Alloy's stranding wire and braiding wire have also been put up on the plastic spools. The new five pound spools are used for wire from .020 inches diameter down to .0045 inches diameter, and are available upon request for all soft temper wire.

Heads New Chemetron Office

Appointment of **Edmund W. Dugan** to head a Washington, D. C. office being established by **Chemetron Corporation** has been announced by **James W. Dunham**, vice president.

* * *

The office, in the new Moreschi Building, 905 16th Street, N. W., will handle business in Washington for the Chicago concern and its subsidiaries and affiliate companies.

* * *

Mr. Dugan, previously business manager for Chemetron's Girdler Catalysts operation in Louisville, Ky., recently served, on loan from the company, as assistant director of the General Industrial Equipment and Components Division of the Business and Defense Services Administration, U. S. Department of Commerce.

* * *

Chemetron has eight Divisions: National Cylinder Gas, Tube Turns, Pennsylvania Forge, Pan Geo Atlas Corp., Girdler Construction, Girdler Process Equipment, and Cardox and Chemical Products; two major subsidiaries: The Allbright-Nell Company and NCG International, C.A.; and two affiliate companies: Tube Turns Plastics, Inc. and Midwest Carbide Corporation.

Repair, Rebuild, or Replace?

Entitled "Repair, Rebuild, or Replace?", a new 4-page two-color brochure available from **Gahr Machine Rebuilding Co.**, 19199 St. Clair Ave., Cleveland 19, Ohio, gives a straightforward message for management and operating personnel of firms owning machine

tools. It draws the line between repairing and rebuilding, telling when you can get by with the one and when you need the other. It also tells which machines are worth rebuilding, and how to tell them from those that it does not pay to rebuild. Since rebuilding and modernization go hand in hand, the brochure also covers the many improvements that can be expected from modernization. Copies are available upon request.

Wire Cloth Representative Moves

H. M. Pforsich Co., direct mill representative for the **New York Wire Cloth Co.**, York, Pa., has moved to new quarters in both San Francisco and Los Angeles. The firm serves a territory that includes eleven western states. Its new addresses are: 466 Western Merchandise Mart, 1355 Market Street, San Francisco 3; and 2343 Saybrook Ave., Los Angeles 22.

New Tank Cover for Hi-Temp Corrosive Service

The Ceilcote Company has announced the availability of high strength self-supporting Duracor tank covers for handling strong acid solutions at elevated temperatures in the chemical, metalworking, and allied industries. Designed by Ceilcote, these covers replace metal, brick and lead fabrications at comparatively low cost. Duracor covers require no lining, painting or other maintenance operation common to such service.

* * *

A Duracor cover measuring twenty-five feet in diameter and a half-inch thick can support the weight of two 200-lb men at any one point. The reinforced outer perimeter and I-beam construction make it completely self-supporting.

* * *

To increase resistance to hydrofluoric acid in this application, a special veiling of Orlon is applied to exposed surfaces. Fabricated from 6400 Series Duracor for maximum fire retardant qualities and resistance to heat distortion, the

APCO Steel Reels Assure Smooth Spooling at HIGH SPEEDS

High-speed wire processing calls for reels, spools and bobbins engineered to close tolerances. That's why Apco Mossberg steel reels are *designed* to meet your exact requirements for size, construction, trueness and balance. The result is a strong, safe, processing package . . . smooth spool-out with no wire breakage or snagging . . . minimum machine breakdown, plus many more on-the-line economies.

Tell us your reel problem, whether it's for drawing, stranding, or any other type of wire processing. Apco Mossberg has the answer that makes real sense. Write, wire or phone collect.

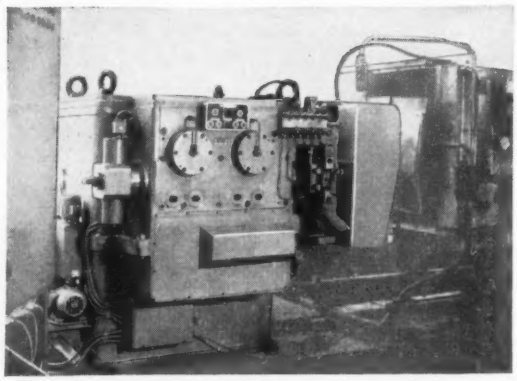
Pacific Coast Representative:
GORDON PROFFITT
World Trade Center, Ferry Building
San Francisco 11, California

Canadian Representative:
HUGH P. WILLIAMS & CO.
47 Colbourne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

New HOTMASTER

Automatic Hot Forming Press . . .



STANDARD NUT

PIPE REDUCER

CASTER WHEEL

BALL BEARING RING

Designed and built by German craftmanship whose experience in the hot forming of parts is recognized throughout the world by the bolt industry.

- ★ New, advanced design
- ★ SCALE FREE PRODUCTION of nuts and parts from hot rolled material
- ★ FAST SET-UP TIME
- ★ No royalty payments

MACHINE PRODUCTION

TYPE	MACH. CAP.	NUTS PER MIN.
WSPE 10	½" NUTS	Up to 180
WSPE 20	¾" NUTS	Up to 120
WSPE 30	1¼" NUTS	Up to 100
WSPE 50	2 " NUTS	Up to 80

Write or Phone ED 1-4858 for details!

Sold and Serviced in U.S. and Canada by

The BOLTMASTER Co.

Exclusive importers of Peltzer & Ehlers, Krefeld, Germany—builders of machinery for the Bolt Industry since 1888

21055 Lorain Road, Cleveland 26, Ohio

cover is designed for operating temperatures ranging from 280° to 300° F.

* * *

A new six-page bulletin covering standard specifications and visual standards is available on request from **The Ceilcote Co.**, 4832 Ridge Rd., Cleveland 9, Ohio.

Booklet on Power Tensioners and Sealers

A new Signode booklet tells how to save time and effort and do a better, more uniform job of steel strapping. It describes many of the ways in which air power strapping tools are serving industry. It gives useful data and descriptions of Signode's complete line of air power tensioners and sealers.

* * *

For a copy write **Signode Steel Strapping Company**, 2600 North Western Av., Chicago 47, Ill., asking for folder SPD-216.

New Line of Speed Reducers

The Cleveland Worm & Gear Company has announced an entirely new line of "high horsepower" speed reducers capable of transmitting as much as 80 per cent more horsepower above that carried by conventional worm gear units. Cleveland, a subsidiary of Eaton Manufacturing Company, has already placed in production smaller-sized speed reducers ranging from 1 h.p. to 40 h.p. Larger sizes are in various engineering stages, with most models now in process of exhaustive testing.

* * *

Cleveland first introduced fan-cooled worm gear reducers 15 years ago, after several years of intensive, costly development work and testing. Since then, Cleveland has built thousands of fan-cooled reducers. Field experience has proved that the original designs were practicable and were a major contributing factor to the adoption on June 15, 1959, of American Gear Manufacturers Association Standard 440.03 covering fan-cooled worm gear speed reducers.

* * *

This new line of fan-cooled reducers incorporates in its design all the knowledge gained through Cleveland engineering experience

over the past 47 years — plus advantages of modern metallurgical techniques and manufacturing processes.

* * *

Full information, including horsepower and torque tables, service factors, application/load classifications and dimensions, is available on request to The Cleveland Worm & Gear Company, 3300 East 80th St., Cleveland 4, Ohio.

Loma Publishes Bar Processing Line Bulletin

A new 4-page bulletin features the "Lomatic" Automatic High Speed Machine for the continuous cold drawing, straightening, cutting and polishing of bars from coiled rod. The equipment processes rounds, squares, hexagons and rectangular sections in both ferrous and non-ferrous metals. Details of machine construction and operation are given, and various photographs illustrate a representative installation.

* * *

Free copies of this bulletin No. 596 are available from **Loma Machine Mfg. Co., Inc.,** 114 East 32nd Street, New York 16, N. Y.

New Polyolefin Plant

Decision to build a new plant for the production of oriented polyolefins in Port Neches, Texas, was announced recently by **L. O. Crockett,** president of **Goodrich-Gulf Chemicals, Inc.**

* * *

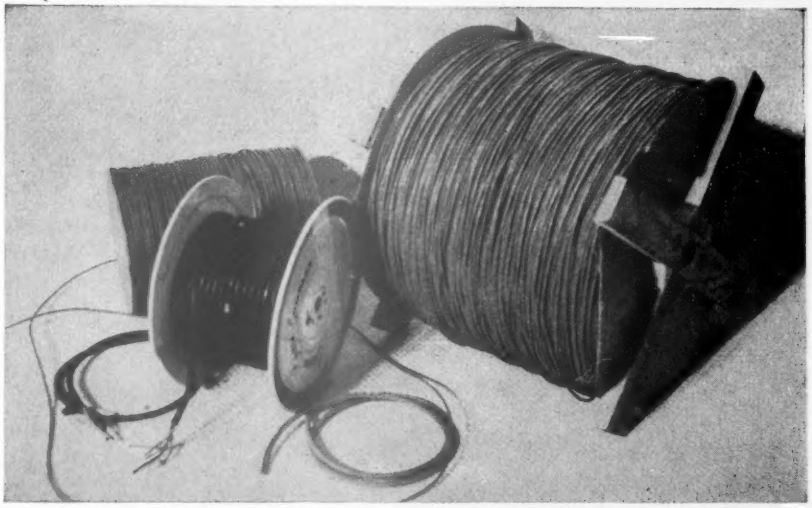
Adjacent to the company's manmade rubber facilities at Port Neches, the new plant will, at first, produce a type of high density polyethylene not now manufactured in the United States.

* * *

Construction of the plant, which will have an initial capacity of 13,000,000 pounds annually, has been started and is scheduled for completion late in 1960.

* * *

Specific characteristics, including outstanding environment stress crack and thermal resistance, have been built into the Goodrich-Gulf polyethylene which



For High Tensile Strength, Specify

TEXTILENE GLASCOR*

Soft, dry fillers for portable and flexible cords, Textilene Glascor and Twi-Port have wide acceptance. Fiberglas-centered Glascor is exceptionally strong without added bulk or sacrifice of pliability. It goes into S, SJ, and SV cords with 18, 16, and 14 gauge conductors — Twi-Port into S and SJ cords with 12 gauge and larger conductors. Successful applications include control, appliance, and power cables; telephone drop wire; communications and coaxial cables.

Twitchell's superior Textilene line also includes: Fungus-resistant filler — *Twi-Tar.* Used for buried communications cable. expanded ACSR cable, and in other applications.

Moisture-resistant fillers—*Twi-Flex* and *Twi-Wax.* Used for nonmetallic sheathed cable, maritime shipboard cable. varnished cambric cable.

*Patent No. 2832190

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit ail equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

Third and Somerset Streets, Philadelphia 33, Pa. • REgent 9-7800

PAPER PRODUCTS FOR THE WIRE INDUSTRY

Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven

ADDISON ELECTRIC

CABLEMAKERS INSTRUMENTATION

The most advanced—most complete—and most versatile in the world
In use in over 200 Cable plants—and in more than 30 countries

Typical small Extrusion Control Station, combining Automatic Capacitance with Size Control and Recording

Small Extrusion Control Station incorporating Optical Diameter Control and Eccentricity Monitoring.

Ingenious system of building blocks permits extension, modification, and assembly of hundreds of different combinations of Control Stations, to individual requirements, at moderate cost.

ADDISON'S UNIQUE RANGE OF UNITIZED SYSTEMS COMPRISE

- Cable Eccentricity Monitors and Controllers
- Wire Preheaters with Automatic Temperature Control
- Corona Test Sets for scanning and final tests
- Optical scanning Size Monitors and Controllers
- Wall Thickness and Dual Plane Controllers
- Contact Size Monitors and Controllers
- Capacitance Monitors and Controllers
- High Frequency and D.C. Spark Testers
- Cable Impregnation Monitors
- Wire Tension Gages — etc.

SALES & SERVICE: **MUIRHEAD INSTRUMENTS INC.**
441 Lexington Ave., New York 17, N.Y. Tel: Murray Hill 2-8131
432/3

will be manufactured by a new process based on Ziegler chemistry. This process has been developed during four years of pilot plant operation and is designed to produce ethylene polymers particularly suitable for use in bottle, pipe, wire and cable applications.

* * *

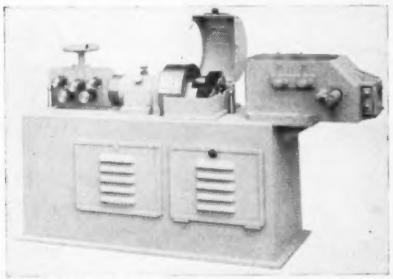
This is Goodrich-Gulf's first venture into the manufacture of polymers other than elastomers. The company's sales and executive offices are at 3121 Euclid Ave. Cleveland 15, Ohio.

Mechanical Wire Descaler

Straus-Artys Corp. of 45 No. Station Plaza, Great Neck, N. Y., announces the new Salvi Mechanical Wire Descaler for the processing of wire rod of low carbon, high carbon, alloy or stainless steel.

* * *

Salvi Descalers not only break and remove the scale, but also



Mod. FAC Type 2 mechanical Descaler

brush the rod clean and then apply forced lubrication and at the same time begin the wire drawing operation.

* * *

The rough rod is introduced into the descaler which completely removes the oxide and prepares the rod surface for the subsequent wire drawing operation. Since with mechanical descaling no acids are used, it completely does away with the sometimes difficult problem of acid waste disposal.

* * *

Salvi Mechanical Descalers come in several size models to suit particular needs.

New "Sure-Flex" Couplings

A low-cost Junior line of "Sure-Flex" couplings is announced by **T. B. Wood's Sons Co.**, Chambers-

burg, Pa. The three "J" sizes are: 3J, for stock bores from ⅜ through ¾ inches; 4J for stock bores from ½ to 1 inch, and 5J, for stock bores from ⅝ to 1⅛ inches. Peak horsepower ratings, at 1,750 rpm, are: 3J, 1.5 hp; 4J, 3.0 hp, and 5J, 6.0 hp.

* * *

The lower cost is obtained by casting the flanges from zinc alloy AG40A, which has a tensile strength of 41,000 psi. The Junior line retains all the desirable features of the standard "Sure-Flex" coupling. Design, however, has been somewhat simplified.

* * *

Wood's has also added to the regular "Sure-Flex" line a new number 14 coupling, which is rated at 500 peak horsepower at 1,750 rpm. It will accommodate shafts ranging from 1 inch through 3-15/16 inches.

Edmands Expands Plant

The Edmands Company, manufacturers of twisting, twinning, tripling, quadding, bunching and taping machinery, together with

Photo showing plant addition

accessory equipment such as capstans, has underway a plant expansion program that will be ready for occupancy early in 1960.

* * *

Sidney B. Blaisdell, President, states that the expansion became necessary due to the increasing demand for the company's products and to provide production facilities for some newly engineered equipment that is being readied for the market.

* * *

The new construction is an addition to the existing plant at 860 Wellington Ave., Cranston, R. I. Besides housing additional production equipment, it will provide quarters for a separate engineering department and enlarged office space.

Your best buy...

124-INCH DIAMETER
50 TON CAPACITY
STEEL REEL
for oil filled cable

BETTER QUALITY
LONGER LASTING

NYECO

Steel Shipping Reels

ASSURE SAFE DELIVERY of your cable with rugged, weather resistant, splinter-proof NYECO steel reels. Protects costly cable against damage in shipping and processing due to dropping, bouncing, rough handling. Costs little more than wooden reels... lasts up to 10 times longer... requires minimum maintenance.

NYECO ALSO MANUFACTURES reels to United States Signal Corps., Bureau of Ships and other government agency specifications.

WHAT ARE YOUR REQUIREMENTS?

Send specifications for STEEL SHIPPING REELS, IMPREGNATING REELS, PROCESSING REELS, SUBMARINE CABLE REELS AND BRIDGE REELS. Prompt deliveries on large or small orders.

OTHER FINE NYECO PRODUCTS

- Impregnating Tanks
- Floor Rolls
- Vulcanizers
- Pressure Vessels

ANY QUANTITY — ANY SIZE — ANY FLANGE DIAMETER from 42" up

Specialists to the wire industries for over 50 years.

NEW YORK ENGINEERING COMPANY

75 WEST STREET • NEW YORK 6, N. Y.

TELEPHONE: WHitehall 4-5380 • CABLE: NYECO, N. Y. • PLANTS: YONKERS, N. Y.

Outstanding Personalities of the Wire Industry

Firth Sterling Appointments

Firth Sterling Inc. has announced the appointment of **Zane H. Markley** as sales engineer to handle the sales of the Company's carbide products in Utah, and steel and carbide products in Colorado and northern New Mexico, and of **William J. Lohmeyer** as manager of high speed steel sales.

* * *

Before joining Firth Sterling, Mr. Markley was a sales engineer with Kennametal, and previous to that, had extensive machining experience with Pennsylvania Railroad, Gates Rubber Company, and O. K. Rubber Company. Mr. Lohmeyer was a manufacturers' representative and associated with Jessop Steel Company. Prior to this, he was Pittsburgh district manager for Latrobe Steel for twelve years.

Ralph B. Roth Retires

After 55 years of service, **Ralph B. Roth** will retire as Vice President, Secretary & Director of Purchases for the **Ludlow-Saylor Wire Cloth Company,** St. Louis, Missouri. Effective date of retirement was January 22, 1960.

Ralph B. Roth

* * *

Mr. Roth joined Ludlow-Saylor as a messenger boy in 1905; he has been with the company ever since. He has been an active member of The Wire Association for 27 years, a Director from 1946 through 1958, and Vice President from 1950 through 1955.

* * *

He is a 42-year member of the St. Louis Chapter, National Association of Purchasing Agents. He held the position of Vice President of this organization from 1931 through 1932.

* * *

Vernon C. Thomas, a member of Ludlow-Saylor's Purchasing Department for the past 9 years, has been chosen to succeed Mr. Roth.

Glader-Years of Proven Performance
GLADER NAIL MACHINES
55 YEARS of experience meeting the exacting demands of nail making.
The machine with a record of steady dependable service.
Wm. GLADER MACHINE WORKS
210 N. RACINE AVENUE
CHICAGO 7, ILLINOIS
EXPORT DEPT. 122 EAST 42ND STREET -:- NEW YORK 17, N. Y.

Ludlow-Saylor manufactures wire cloth and screen for industrial uses.

Acrometal Products Sales Appointments

Fred J. Bieber, president of **Acrometal Products, Inc.,** Minneapolis, has announced two important personnel appointments effective immediately. **Thomas R. Polglase,** formerly Vice President and Midwestern sales representative, has been promoted to Sales Manager, and **Raymond G. Althaus** has been appointed to take over the Midwestern sales territory formerly covered by Polglase.

* * *

This expansion in the sales and executive personnel of Acrometal is traceable directly to the growth and expansion of the company — and especially to the diversification of its business. During the past eighteen months Acrometal has moved rapidly into the field of designing and building special equipment to handle special needs in the wire industry.

* * *

Ray Althaus comes to Acrometal with a background of experience in wire production and he can talk wiremen's language. His last ten years have been spent working directly with the problems of the industry. During most of this period he was with **General Cable Corp.,** St. Louis, where he served as plant training director, methods and training supervisor, plant industrial engineer, plant superintendent, personnel manager and as a specialist in packaging and containers for magnet and enamel wire. He was active in promoting the concept of non-returnable reels and made numerous contributions to their development.

(Left) Thomas R. Polglase
(Right) Raymond G. Althaus

* * *

Tom Polglase will headquarter at the company's Minneapolis office. As the new Sales Manager he will be continually at service not only to friends in his old territory but to areas beyond his former contacts.

American Pulley Appoints Southwest Representative

The American Pulley Company, Philadelphia, Pa., has announced the appointment of **James W. Wayland** as southwestern representative for both its power transmission and materials handling equipment. He will serve Texas, Oklahoma, Louisiana, Arkansas and parts of Mississippi from newly established offices and warehouse at 2110 Farrington Street, Dallas, Texas.

* * *

world wide sales...
. . . indicate a world-wide reputation. Hanson & Edwards have supplied High Speed Tubular Stranding Machines to many of the most important Wire Rope and Cable factories throughout the world. These machines have rotors which run in large SPLIT ROLLER BEARINGS, not on support rollers, giving higher speeds, smoother running and lower maintenance costs
U.S.A.
NORWAY
SWEDEN
AUSTRALIA
SCOTLAND
FRANCE
NORTHERN IRELAND
RHODESIA
INDIA
ENGLAND
AUSTRIA
CANADA
SOUTH AFRICA
MALAYA
WALES
EIRE
BELGIUM
ITALY
CZECHO SLOVAKIA
ROLLER BEARING TYPE
HIGH SPEED TUBULAR
STRANDING MACHINES
Made in various sizes for reels from 5" x 2½" up to 24" x 12"
Write now for details
HANSON & EDWARDS LTD
WARRINGTON ENGLAND
SALES ORGANISATION
JAMES DAY (MACHINERY) LTD
28 MADDOX STREET LONDON W1
U.S. AGENTS:—THE EDMANDS COMPANY 860 WELLINGTON AVENUE CRANSTON 10, R.I.
P2035

The new Dallas facilities will carry complete stocks. Power transmission stocks will include shaft mounted speed reducers, fixed and adjustable V-belt drives, steel pulleys and motor bases. American hand and platform trucks, pallet and skid trucks, and hand and hydraulic powered elevating trucks will be among the material handling equipment stocked.

Wire Cloth Man Elected to New Office

Stuart M. Jones has been appointed executive vice president of **New York Wire Cloth Co.**, York, Pa., **L. D. Root, Jr.**, president, has announced. Mr. Jones has been vice president and general manager of the wire products division for the past two years. His new duties will include the direct supervision of activities in all plants and subsidiaries of the company, including the Lofstrand Co., Rockville, Md., and the Liberty Wire Co. and Liberty International, Inc., Hato Rey, Puerto Rico.

Armco Realigns Sales Staff

The realignment of several sales and marketing activities in the Armco Division of **Armco Steel Corporation** was announced recently by **Murray B. Wilson,** sales vice president of the division.

* * *

Three new product departments have been created to provide stepped-up aid to the division's field sales force.

(Left) Joseph P. Butterfield
(Right) Stanley P. Watkins

James G. Wikoff will be manager, carbon steel products. Assistant manager will be **Adam D. Sechrist.**

* * *

William Jones has been named manager, magnetic steel products, and **Raymond G. Sloan, Jr.,** will be assistant manager.

* * *

Joseph P. Butterfield has been appointed manager, stainless steel products, and **Stanley P. Watkins** becomes assistant manager.

Catalytic Combustion Appoints Sales Manager

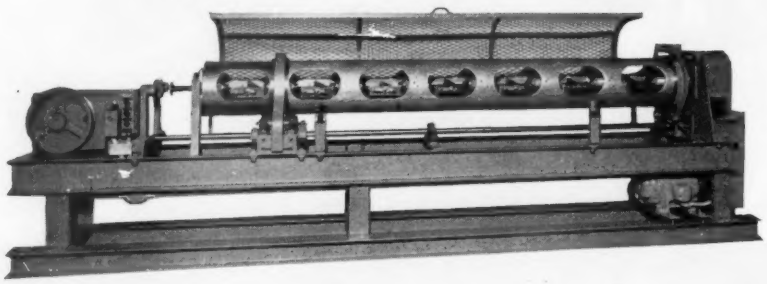
Catalytic Combustion Corporation of Detroit, Michigan, has announced the appointment of **James L. Donahue** as General Manager of its Sales Department. The company who pioneered the use of metal catalysts for oxidation reactions for both air pollution control and heat recovery are expanding the application of their process to gas purification and other chemical manufacturing operations.

SEVEN BAY
HIGH SPEED
STRANDER

MODEL 7 B 55

This precision, perfectly balanced machine features: rigid steel box structure-barrels of high strength ALCOA alloy — motor mounted below center of gravity — safe, positive drive — push button controls— carbide wire guides — interchangeable cradle assemblies — standard cradles taking 7" diam. X 4" Traverse Spools — 30 lengths of lay.

BARTELL FOR THE BEST



• CATERPILLAR CAPSTANS • SINGLE & MULTIPLE HEAD RESPOOLERS • WIRE STRANDERS
• TAKE-UP & PAY-OFF STANDS FOR PLATING EQUIPMENT

BARTELL MACHINE-TOOL CORP.
YACHT CLUB ROAD ROME, N. Y.
• DESIGNERS • MANUFACTURERS • ENGINEERS • CONSULTANTS

WE ALSO DESIGN AND BUILD SPECIAL EQUIPMENT TO MEET SPECIFIED REQUIREMENTS

Mr. Donahue has been Assistant Sales Manager, responsible for distribution of the company's product in the Chemical Process Industries, with prior experience in Catalytic's engineering and research departments. He is a graduate of the Lawrence Institute of Technology.

Amchem Transfers Taylor

In January 1960, **Robert W. Taylor** was transferred to Kansas City as the technical sales representative for the Metalworking Chemicals Division of **Amchem Products, Inc.** He will be attached to Amchem's Central District Office, located in St. Joseph, Mo., to cover Missouri, Kansas, Colorado and Nebraska.

Carpenter Steel Appoints Atlantic Regional Manager

The Carpenter Steel Co., Reading, Pa., has appointed **Robert P. Uhl** to the post of Atlantic regional manager, effective January 1, 1960, to be responsible for sales in the areas served by the warehouses in Philadelphia, North Jersey, New York, Providence, Hartford, and Bridgeport. He will be located at Carpenter's Woodside, L. I., N. Y., mill-branch warehouse.

AS&W Shifts Kyndberg to Cleveland

Frank E. Kyndberg, top sales official for American Steel & Wire Division's **Cyclone Fence Department** at Waukegan, Ill., has been transferred to the Cleveland headquarters of this U. S. Steel Division, it was announced by **E. A. Murray,** vice president-sales. In his new location, Mr. Kyndberg, as manager of Cyclone Fence sales, will continue to supervise the department's sales activities, now working directly with the Wire Division's general manager of sales solicitation, **Boyd P. Doty, Jr.**

J. W. Nall Elected V. P.

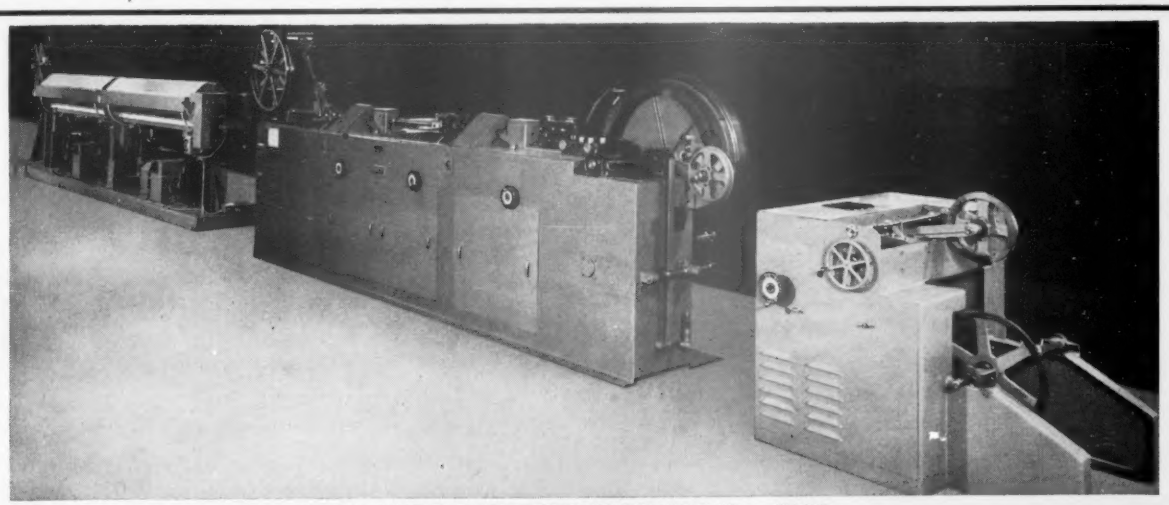
Lamson & Sessions Co., Cleveland, Ohio, have announced the election of **J. Wallace Nall** to the office of Vice President. He will continue to serve as general manager of the fastener firm's Chicago plant at 5025 W. 73rd St., Chicago 38, Illinois.

Executive Changes at Anaconda

Anaconda Wire & Cable Co., New York, has elected **David E. Allen** executive vice president to succeed **Richard B. Steinmetz,** who was elected president last October. Mr. Allen was vice president-sales. **William H. Benton Jr.,** former general manager-mills, has been elected vice president-manufacturing to succeed **Vito F. Di Lustro,** retired. **John L. Tindale,** former commercial vice president, was advanced to vice president-marketing and sales, and **Henry V. Van Valkenburg,** general sales manager, has been made vice president-general sales manager.

BISRA Appointment

The British Iron and Steel Research Association announces that **S. S. Carlisle,** M.Sc., A.M.I.E.E., Head of the Physics Department, has been appointed an Assistant Director. He will be especially concerned with the co-ordination of



4D-1-BB GLASS INSULATION WIRE COVERING MACHINE No. 1088

Patented Aug. 3, 1943

WITH VARIABLE SPEED DRIVE.
TORQUE MOTOR DRIVEN TAKE-UP REEL STAND
BALL AND ROLLER BEARING MOUNTED
BAKING OVEN WITH DOUBLE VARNISH APPLICATOR
AND AUTOMATIC TEMPERATURE CONTROLS.

WIRE DRAWING, ENAMELING, TINNING, INSULATING,
TAPING, GLASS-COVERING, PANNING AND ALLIED MACHINERY

EST. 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.

the Association's work on automation and information handling which is now a vital part of the research programme. His work will include co-operation with laboratories and firms outside the Association with a view to increasing the overall research and development effort devoted to automation in the steel industry.

* * *

Mr. Carlisle graduated at The Queens University, Belfast, (College of Technology) in electrical engineering, and later was granted the degree of M.Sc. in 1942. He joined BISRA in 1942.

To Handle Wire Rope Sales

The Paulsen-Webber Cordage Corp., New York, N. Y., has announced the election of **Homer C. Lane** as Vice-President in charge of sales and operations for the company's six branch offices and warehouses located in Boston, Baltimore, Philadelphia, Norfolk, New Orleans and Houston. Paulsen-Webber is one of the country's leading independent manufacturers of wire rope. Their wire rope mill is in Sunbury, Pa., and has nearly doubled its production in the past year due to major technological improvements.

Four N-S Officials Retire

National-Standard Company announced at its annual meeting the retirement from active employment of **W. H. Parkin,** chairman of the board of directors and an employee for 52 years, and three other former officers. They are **A. H. Johnson,** co-chairman of the board; **J. A. Cooke,** vice president and treasurer, and **K. D. Smith,** formerly vice president of Rubber and Automotive Relations.

* * *

T. H. Pearce, president, said though they are no longer employees, Mr. Parkin will continue as chairman, Mr. Johnson and Mr. Cooke as board members and Mr. Smith will serve as an advisor. **G. Russell Ramsby,** assistant treasurer, was elected treasurer, and the other officers were re-elected.

Viking Wire Appoints Sales Manager

Simon J. Warschauer has been appointed National Sales Manager for the **Viking Wire Company, Inc.,** Danbury, Conn., according to an announcement by **John W. Hoffer,** President.

* * *

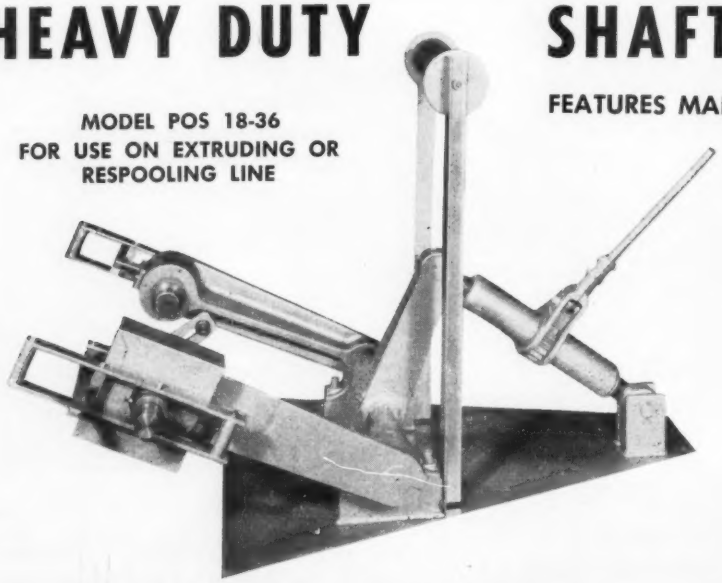
Mr. Warschauer, formerly General Manager for Electric Conductors, Inc., recently returned from Puerto Rico where he set up a magnet wire manufacturing plant. He has had long experience in the electrical and magnet wire industry, and now will direct sales for Viking.

* * *

Viking Wire recently completed construction of its new manufacturing plant in Danbury, Conn. According to Mr. Hoffer, the new plant is one of the most modern in the magnet wire industry. The firm was founded in 1952 and has grown steadily since that time. Mr. Hoffer predicts increased sales in 1960, based on the growing

HEAVY DUTY SHAFTLESS PAY-OFF

MODEL POS 18-36
FOR USE ON EXTRUDING OR RESPOOLING LINE



FEATURES MAKING FOR SUPERIOR PERFORMANCE

REEL SIZES: 12" to 36" diam. and 24" max. width.

REEL LOADING AND UNLOADING: mechanical rachet type lift or air operated lift.

MAX. WEIGHT: Up to 1500 lbs. Cast malleable iron lifting arms.

SHAFT SIZES: 1¼", 1½", 2". Adapters can be furnished for larger reel arbor holes.

ADJUSTABLE WIRE TENSION: Mechanical or electrical — reel pintles supported by ball bearings to minimize starting tensions. Brakes stop the reel.

ENGAGEMENT AND DISENGAGEMENT OF REELS: Hand lever with self-locking device for fast action on reel pintles. Heavy construction for low maintenance.

DAVIS WIRE & CABLE EQUIPMENT

DAVIS ELECTRIC CO.
WALLINGFORD, CONNECTICUT

DUAL and SINGLE TAKE-UPS • PAY-OFFS • CAPSTANS
SPARK TESTERS • RE-SPOOLERS
RAM-TYPE TEFLON EXTRUDERS

WRITE FOR FULL DETAILS STATING NEEDS

demand for magnet wire products for use in everything from household appliances, industrial machines, electronic devices to guided missiles.

N. A. Hansen

It is with regret that word has been received of the passing of **N. A. Hansen,** Superintendent of the Rod & Wire Department of Jones & Laughlin Steel Corporation's plant at Aliquippa, Pa.

* * *

Mr. Hansen died on January 24th after a long illness. He had been a member of The Wire Association for the last eleven years.

General Purpose Control Catalog

Catalog GEC-1260D, a new 72-page publication, contains information on the complete line of control devices manufactured by the **General Electric Company's** General Purpose Control Department.

* * *

Horsepower selection charts are listed for motors from one-fourth through 200 horsepower, providing quick selection of starters, heaters and push button stations necessary for control of these motors.

* * *

The catalog includes complete product description of motor starters both manual and magnetic, contactors, relays, solonoids, limit switches, push buttons, static control and pilot devices. Pricing tables for each device are included with descriptive information. Features, wiring diagrams, dimensions and application information for each device are also included.

* * *

Appropriate General Electric handbook section and available supplemental bulletins are listed for each product type. For a copy, write General Electric Company, Schenectady 5, N. Y.

New Furnace Announced

Sunbeam Equipment Corp., Meadville, Pa., has issued a bulletin describing its all-new Shuffle Hearth Furnace, for the continuous atmosphere heat treating and quenching of metal parts.

The Furnace can harden and carbo-nitride parts within an operating range of 1400°F. to 1800°F. It is automatic in that once the furnace is charged with work it is not handled again until quenched and carried away on a conveyor.

* * *

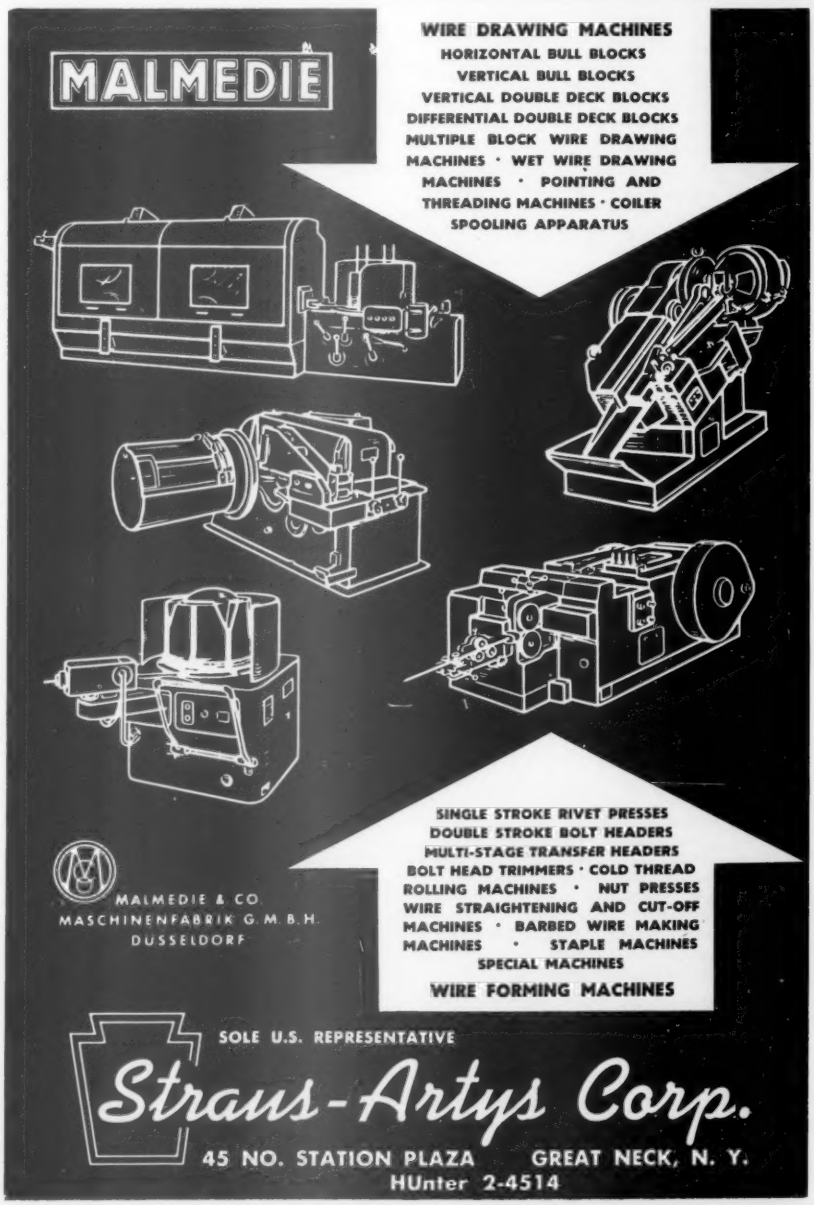
For full details, write Sunbeam for a copy of Bulletin SEC-7.

NyALite Magnet Wire

NyALite magnet wire is a two-part combination of Formvar overcoated with nylon. It was developed to take advantage of the best properties of each. It results in a wire with the good moisture resistance of Formvar and excellent craze resistance and windability of nylon.

* * *

Vinyl acetal has a tendency to craze, or form hair line surface film cracks around the wire when wound into coils. This condition, caused by the bending stresses exerted on the insulation, is accentuated as the wire comes in contact with most impregnating varnish solvents. The crazing can be corrected only by annealing the formed coil for a period of not less than ten minutes (preferably long-


MALMEDIE
WIRE DRAWING MACHINES
HORIZONTAL BULL BLOCKS
VERTICAL BULL BLOCKS
VERTICAL DOUBLE DECK BLOCKS
DIFFERENTIAL DOUBLE DECK BLOCKS
MULTIPLE BLOCK WIRE DRAWING MACHINES · WET WIRE DRAWING MACHINES · POINTING AND THREADING MACHINES · COILER SPOOLING APPARATUS
MALMEDIE & CO.
MASCHINENFABRIK G.M.B.H.
DÜSSELDORF
SINGLE STROKE RIVET PRESSES
DOUBLE STROKE BOLT HEADERS
MULTI-STAGE TRANSFER HEADERS
BOLT HEAD TRIMMERS · COLD THREAD ROLLING MACHINES · NUT PRESSES
WIRE STRAIGHTENING AND CUT-OFF MACHINES · BARBED WIRE MAKING MACHINES · STAPLE MACHINES
SPECIAL MACHINES
WIRE FORMING MACHINES
SOLE U.S. REPRESENTATIVE
Straus-Artys Corp.
45 NO. STATION PLAZA GREAT NECK, N. Y.
HUnter 2-4514

er) before the varnishing operation.

* * *

NyALite magnet wire eliminates this added operation by providing a continuous flexible nylon outer coat, covering the vinyl acetal and protecting it against the undesirable effects of the impregnating varnish.

* * *

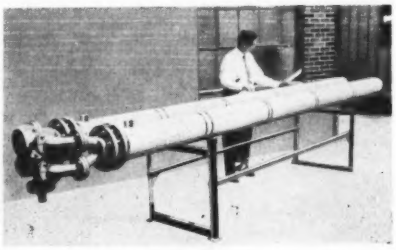
Vinyl acetal and nylon are applied to the wire in one continuous operation under carefully controlled conditions, which provides a well integrated insulating film. The approximate relationship of film addition is 75% vinyl acetal to 25% nylon. NyALite is a Class A (105°C) magnet wire that provides all the electrical, physical, and chemical properties of an equivalent vinyl acetal insulation plus the added protective qualities of nylon.

* * *

Manufactured by the **Electric Auto-Lite Company** to rigidly controlled standards, NyALite magnet wire is available in two grades: Single, and Heavy.

Sulfuric Acid Anodizing Solution Cooled at Low Cost with Heil "Nocordal" (Impervious Graphite) Heat Exchangers

A large aluminum processor reports that these two heat exchangers, utilizing **Heil Process Equipment Corporation's** "Nocordal" impervious graphite tubes 15 feet long, are being used successfully for keeping 3,100 gallons of sulfuric acid anodizing solution at 70° F., using cooling water at 40° F., total capacity 290,000 BTU per hour. The "Nocordal" graphite tubes have excellent heat transfer qualities; are inert to corrosive attack; and relatively free from maintenance.



Due to their chemical resistance, these exchangers can be used for heating or cooling an extremely large number of corrosive solutions, including acids or mixed acids, such as hydrochloric, sulfuric, hydrofluoric, nitric, phosphoric, and many others. "Nocordal" heat exchangers are fabricated by Heil Process Equipment Corporation of Cleveland, Ohio, in a wide range of standard sizes, and can also be furnished in special sizes to meet any requirement.

* * *

For further information, address the Company at 12901 Elmwood Ave., Cleveland 11, Ohio.

Get the habit of reading

regularly

WIRE AND WIRE PRODUCTS

The Wire Man's Magazine

EXECUTIVE REPORT #7

STRAIGHT-LINE DESCALING AUTOMATES WIRE AND BAR DRAWING LINES

Wheelabrator abrasive blast descaling brings new automation to wire products manufacture, with substantial savings in time and labor. Whereas batch pickling requires multiple handling operations, this mechanical descaling process involves handling coils only once or twice.

Rod can be straightened, cleaned, coated, drawn and cold headed in one continuous, straight-line operation. Single or multiple strands can be cleaned at speeds up to 600 fpm. The savings through eliminating acid pickling and multiple handling are enormous.

Take advantage of WHEELABRATOR'S engineering experience in wire descaling

Wheelabrator's unequalled experience in blast descaling of wire is at your service. Send for Bulletin 148-D illustrating the Wheelabrator automated wire drawing method. **Wheelabrator Corp., 389 S. Byrkit St., Mishawaka, Ind. Canadian Division: P. O. Box 490, Scarborough, Ont.**

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,919,621, NAIL-STAPLE COMBINATION, patented January 5, 1960 by Jesse D. Langdon, Long Beach, Calif.

A plaster board wire nail in combination with a thin sheet-metal structure forming a two-pronged staple is disclosed in this patent.

* * *

No. 2,919,867, WIRE COILER, patented January 5, 1960 by John F. Nelson, Concord, Calif., assignor to United States Steel Corporation, a corporation of New Jersey.

More specifically the coiler is adapted to wind wire upon a spool after being given a predetermined curvature. Eight claims.

* * *

No. 2,920,430, APPARATUS FOR LOADING SHEATHED WIRE HEATING UNITS, patented January 12, 1960 by Murray F. Skinker, Cedar Point, Mich., assignor to General Electric Company, a corporation of New York.

Apparatus is provided for loading sheathed wire heating units of the type having a resistance wire embedded in powdered insulating material within a tubular sheath.

* * *

No. 2,920,555, DEVICE FOR COMPRESSING COILS OF WIRE FOR BANDING, patented January 12, 1960 by Fred Sheriff, Hickory Corners, Mich., assignor to Clark Equipment Company, a corporation of Michigan.

For use with an industrial truck having a vertically movable lift carriage the inventor provides a device for compressing coils of wire for banding, including two compression plates working in conjunction with a pair of laterally-spaced ram tubes secured to one of the plates and adapted to support the coils of wire.

* * *

No. 2,920,677, WIRE-STRAIGHTENERS, patented January 12, 1960 by Paul E. Anderson, Hinsdale, and Lawrence L. Mazza, Naperville, Ill., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

A number of discs are mounted in staggered relation within slots of cylindrical members which rotate in opposite directions, for engaging opposite sides of a wire passing through the cylindrical member for straightening the same.

* * *

No. 2,920,838, STRIP COILING APPARATUS, patented January 12, 1960 by Charles H. Priestley, Bethel, Pa. assignor to United Engineering and Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania.

There are eleven claims to this patent for a strip coiler which includes a driven reel, a number of curved guides forming, with the periphery of the reel, a channel through which the strip moves, and nozzles mounted on the guides for playing a fluid upon the strip and reel.

* * *

No. 2,921,365, DEVICE FOR DESCALING AND CLEANING WIRE ROD, patented January 19, 1960 by Earl C. Planett, San Marino, Calif.

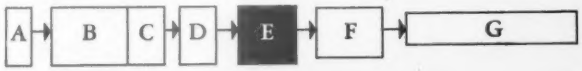
Air jets rotate a rotor having brushes mounted thereon for descaling the wire as air jets exiting from the rotor play upon the wire.

* * *

No. 2,921,428, ROTOR FOR WIRE STRANDING MACHINE, patented January 19, 1960 by Helmut O. Lutcke, Ratingen and Hans W. Schinke, Koln-Mulheim, Germany, assignors to Aktiengesellschaft fur Unternehmungen, Essen, Germany.

A wire stranding machine rotor is

EXECUTIVE REPORT #8



ROD DESCALING, COATING AND DRAWING IN ONE CONTINUOUS OPERATION

at Lamson & Sessions Co.

In their new and ultra-modern Cleveland plant, Lamson & Sessions Co. has proved that Wheelabrator straight-line blast descaling is the shortest distance between hot rolled rod and wire profits.

Their automated descaling line starts with hot rolled rod on a payoff reel (A), provides a portable welding station (B) for joining successive coils, passes through a snarl switch (C) and straightener-leveler (D), through the Wheelabrator blast descaling cabinet (E), through coating and drying equipment (F) and to the draw block and re-coil unit (G) — all in a straight line, with no interruption and no intermediate handling.

This efficient method is made possible by the speed and thoroughness of Wheelabrator airless blast descaling, which removes all scale or rust down to virgin metal, without acid pickling, at speeds as dictated by subsequent operations.

WHEELABRATOR method lets you automate your wire and bar drawing lines

With the Wheelabrator method, you can blast clean in line with patenting, cold drawing and cold heading. To see how many leading producers are saving with this system, write for Bulletin 148-D. Wheelabrator Corp., 389 S. Byrkit St., Mishawaka, Ind. Canadian Division: P. O. Box 490, Scarborough, Ont.

disclosed comprising a pair of elongated coaxial tubes extending over the whole length of the rotor and one of which is located within and spaced from the other; and a number of spacers located between and fixed to the tubes for maintaining the same in spaced relation to each other.

* * *

No. 2,921,429, SYSTEMS FOR PRODUCING MULTI-STRAND TWISTED ASSEMBLIES SUCH AS CABLES, patented January 19, 1960 by Otto Haugwitz, La Celle Saint Cloud, France, assignor to Societe Anonyme Geoffroy-Delore, Paris, France, a French company.

It is stated in the patent that an improved form of revolving twister frame is provided wherein frictional forces on the cable will be reduced, and an improved variable-diameter winch is disclosed.

* * *

No. 2,922,358, SKEWER, patented January 26, 1960 by Kenneth C. Schurr, Grand Rapids, Mich.

A one-piece bent wire skewer is disclosed for cooking food over an open fire and has abutments formed from intermediate portions of the wire for establishing the angular position of the food relative to the fire.

* * *

No. 2,922,442, WOVEN SCREEN CLOTH, patented January 26, 1960 by Clarence Eugene Webber, York, Pa., assignor to New York Wire Cloth Company, York, Pa., a corporation of Delaware.

Adapted for insect screening, the cloth is of warp and weft weaving and has a stable selvage edge of filaments of side-by-side weft placement, and bonded by a resin coating.

* * *

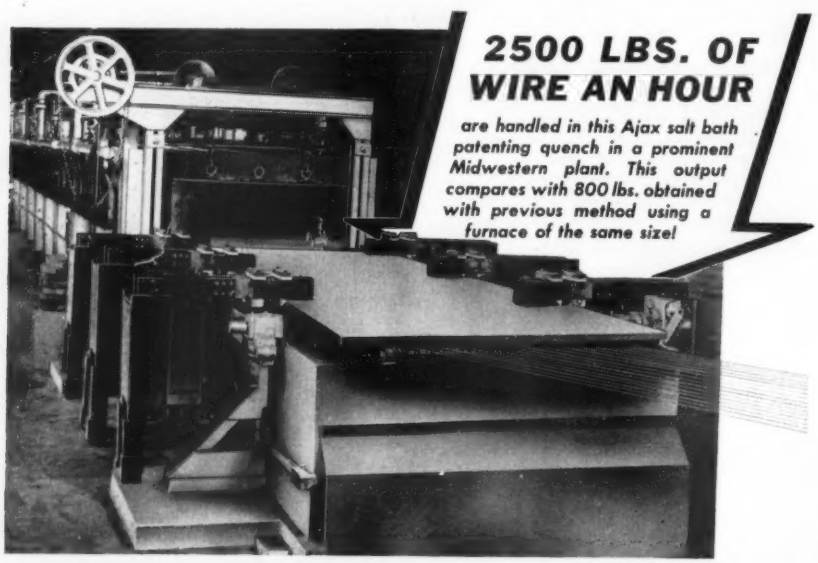
No. 2,922,460, PROCESS AND APPARATUS FOR STRAIGHTENING AND FEEDING WIRE, patented January 26, 1960 by Karl Schwendenwein, Esslingen, (Neckar), Germany, assignor to E.S.C.O. S.A., Les Geneveys-sur-Coffrane, Switzerland.

The process includes clamping a leading portion of the wire; straightening a portion of the thus-clamped wire by moving a wire straightening device therealong in one direction up to a given point of the wire; gripping the thus straightened wire at a point spaced forwardly of this given point at a given distance; moving the wire in feeding direction opposite to the one direction by moving the gripped point and the wire straightening device in the feeding direction while maintaining the gripped point at a constant distance from the wire straightening device; releasing the gripped point and repeating the steps.

* * *

No. 2,922,540, APPARATUS FOR APPLYING MARKERS TO WIRE, patented January 26, 1960 by Hans Johann Krobath, Glen Cove, N. Y., assignor to Abilities, Inc., Albertson, Long Island, N. Y., a corporation of New York.

There are thirteen claims to this patent for applying an adhesive tape marker to wire.


2500 LBS. OF WIRE AN HOUR
are handled in this Ajax salt bath patenting quench in a prominent Midwestern plant. This output compares with 800 lbs. obtained with previous method using a furnace of the same size!

Here's maximum speed, accuracy and economy in Wire Patenting!

No other method offers so many possibilities for quality improvement and cost reduction in the patenting of high- and medium-carbon steel wire or rods. Automatic temperature control—an inherent result of Ajax internally-heated salt bath furnace design—provides continuous accuracy within ±5° F. throughout the bath. You are thus assured of the uniformity so vital to obtaining proper tensile strength and grain structure.

More poundage can be handled. Savings up to 30% in pickling time are common. Salt residue is easily removed by a water wash. The entire patenting process lends itself readily to inexpensive automation. Maintenance is negligible. Long-life, immersed-type electrodes can be changed in an hour or two—without tearing down furnace or pot. Pots last indefinitely.

AJAX
HULTGREN
SALT BATH FURNACES
Internally heated electric and gas-fired types

WRITE FOR AJAX CASE HISTORY BULLETINS ON: ☐ Patenting; ☐ Process Annealing; ☐ Descaling; ☐ Cleaning, Preheating, Fluxing.

AJAX ELECTRIC COMPANY 928 Frankford Ave., Philadelphia 23, Pa.

Publication on Overhead Transmission Lines

Comprehensive technical information on resistance and reactance of aluminum conductors for overhead transmission lines is available from the **Rome Cable Division** of Aluminum Company of America.

* * *

Latest research findings, including information hitherto unavailable, are incorporated in "Resistance and Reactance of Aluminum Conductors." The new report comprises Section 5 of Alcoa's long-range technical research publication project for the utility field, titled Alcoa Aluminum Overhead Conductor Engineering Data.

* * *

Available for the first time are revised data representing results of recent cooperative research programs carried out at Illinois Institute of Technology and Alcoa Research Laboratories. These results include the first accurate evaluation of the effects of the steel core on A. C. S. R. (Aluminum Conductor, Steel Reinforced). Formulas developed during the project are

presented to allow an accurate prediction to be made of the resistance and reactance of a transmission line utilizing any presently available or proposed A. C. S. R. conductors.

* * *

The new publication, and previously issued sections of the data project, are available from any of Alcoa's Rome Division offices, or on request from 723 Alcoa Building, Pittsburgh 19, Pa.

Signode Acquires Cruickshank Patents

The Signode Steel Strapping Company has purchased the Cruickshank patents No. 2,371,878 and No. 2,436,554 (4-way entry pallets). This is in line with the policy Signode has followed in recent years of building up a portfolio of patents.

* * *

The new pallets, usually made of wood, have combinations of fastenings such as nails, screws and bolts. They are all of the 4-way entry type and are of heavy construction for multi-use warehouse operations.

* * *

All Signode wood pallet licensees presently are licensed to sell the standard 4-way entry, block type or notched stringer type pallet under Patent No. 2,369,944, and now have rights under the Cruickshank patents.

* * *

For further information write Signode Steel Strapping Company, 2600 North Western Avenue, Chicago 47, Illinois.

New Round Chart Recorder-Controller

Bulletin GEZ-2969 (four pages) describes features, application, measureable parameters, and specifications for General Electric's newly announced line of round-chart single and double-pen recorders. The null-balance, potentiometric-type model complements G-E's line of strip-chart recorders, and features a high degree of component interchangeability. Bulletin includes dimensions and a list of available charts and scales. For a copy write to **General Electric Company**, Schenectady 5, N. Y.

Price of Molysulfide* Lubricant Additive is Reduced

Effective Feb. 1, 1960 on all shipments of Molysulfide lubricant products, a price reduction of 15¢ per pound across the board was announced by **Climax Molybdenum Company**, a division of American Metal Climax, Inc. This average reduction of 10.7% is made possible by the combination of greatly increased commercial consumption together with recently achieved processing economies, according to **E. E. Smith**, Manager of Climax's Chemical Sales Division. Under the new price structure, the base price for domestic resale of Molysulfide technical will be $1.15 per pound, with technical-fine at $1.35. This compares with former prices of $1.30 and $1.50, respectively.

*Registered trademark

One Good Turn Deserves A "Pen-Bend" Wire Bender

for simplified, precision bending of . . .

- FULL 360° BENDS
- SCROLLS
- EYES
- U BENDS
- ANGLE BENDS
- VARIOUS 2 BEND COMBINATIONS

SPECIFICATIONS

Capacity — 20 gauge to ⅜" diameter or Five ¼" round wires.

Floor Space—16" wide, 72" long, 36" high.

Tooling — Hardened bending tools consisting of 1 Locking Nose, 1 Pointed Bending Nose to assure accurate and tight radius, 5 Radius Dies 1/16" to ⅜" diameter, 1 Angle Die. Roller Bending Nose available.

Foot Operating Valve — with speed control, hose and fittings.

Air Pressure — Requires 65 to 110#.

Wire Length Stops — Adjustable and interchangeable with Wire Holders — universal type, adjustable for all gauges.

Bend Travel — Fine adjustable stroke on cylinder without use of tools

EXCLUSIVE FEATURES

Rotary Disc drilled, tapped and slotted front and rear to receive tooling for operator to work from either side.

Slots for bending nose and angle die insure against slippage.

Rotary Disc drilled for bending pins in place of Bending Nose for large radius bending.

Disc is index tapped and drilled — can be turned and located at 90° increments.

GUARANTEE

PENN Wire Benders are backed by our guarantee as well as the guarantee of the nationally known manufacturers, whose products are used in their construction.

MADE BY PENN... SOLD EXCLUSIVELY BY PENN!

PENN *Machinery Company*

709-A Bethlehem Pike, Philadelphia 18, Pa. Phone: Chestnut Hill 7-2886

Techalloy Opens Plant in Illinois

The Techalloy Company of Bahns, Pa., has announced the completion of a new million dollar plant at Union, Ill., between Elgin and Rockford. The plant will produce wire, rod, and strip of many alloys, including stainless steel, heat resisting steels, nickel alloys, electrical resistance metals and copper, clad with nickel.

* * *

Company officials said that rising demand for these items from the Midwest justifies the installation. Many consumers have had to wait seven to ten days for shipments from the Eastern area plants. The new facility is the first of its type not located in the East.

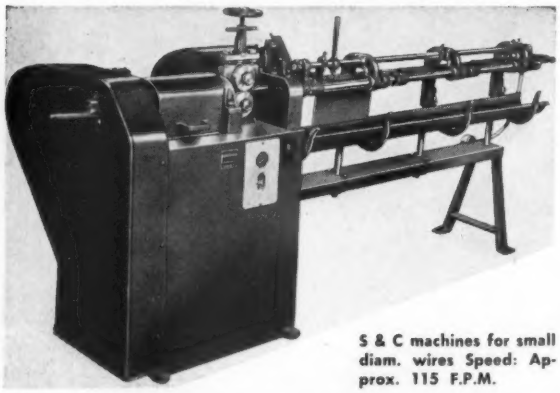
Bulletin on Modernized Harper Line of Tubular Element Furnaces

Just released, new Bulletin GT-1059 presents the recently modernized Harper line of Globar Tubular Element Furnaces for processing a wide variety of work at temperatures up to 3000° F.

* * *

New! Improved! Fast!

WELLS STRAIGHTENER & CUTTER



S & C machines for small diam. wires Speed: Approx. 115 F.P.M.

This completely redesigned line combines maximum efficiency with that rugged dependability, for which WELLS S&C machines have become justly famous.

Built in several sizes to handle 2 to 18 ga. basic and high carbon wire.

FEATURES

The guide bar of these new machines can be supplied for any cut lengths • The rotary flier runs on ball bearings for smoothness and long life • Cut-off is actuated by a solenoid for extreme accuracy of cut lengths • A two point cam construction provides a quick and positive return of the cut-off knife, eliminating the need for a clutch and dog • A counter is standard equipment.

A COMPLETE RANGE OF S & C MACHINES IS MADE BY WELLS FOR ALL SIZES OF WIRE. SEND FOR CATALOG ON THE COMPLETE LINE.

Frank L. Wells Company

Builders of Fine Wire Working Machinery

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

With operating and control features concisely described, the bulletin includes several illustrations of air and controlled atmosphere models as well as dimension drawings and specifications.

* * *

Bulletin GT-1059 can be obtained by writing to **Harper Electric Furnace Corp.**, 110 Pearl St., Buffalo 2, N. Y.

Introduces New Teflon

DuPont is commercially producing a new plastic, "Teflon" 100, the company has announced. It is expected to find wide markets in the electronics and chemical processing industries.

* * *

Known as an FEP-fluorocarbon resin, the new material can be extruded or molded in thermoplastic processing equipment. It was developed as a supplement to DuPont's present line of "Teflon" TFE-fluorocarbon resins, which must be processed in a manner similar to powdered metals.

* * *

Like the TFE resins, "Teflon" 100 is virtually immune to chemical attack, has excellent electrical insulating, anti-stick, and frictional characteristics, and will not absorb moisture. It differs somewhat from the TFE resins in heat resistance, which are rated for continuous service at temperatures up to 500° F, and at higher temperatures for more limited periods of time. The usual continuous service ceiling for "Teflon" 100 is about 100° F lower. Both materials resist extreme cold — down to minus 450° F.

Bulletin on Ventilation Products

New bulletin describes Heil Rigivin (rigid vinyl) and Rigidon (reinforced plastic) collecting hoods, ducts and stacks, elbows and other fittings; includes listing of standard sizes, specifications and chemical resistance data. Enables purchasers to lay out a completely corrosion resistant system for handling corrosive fumes — using standard parts — and install the equipment with their own maintenance men or a local contractor.

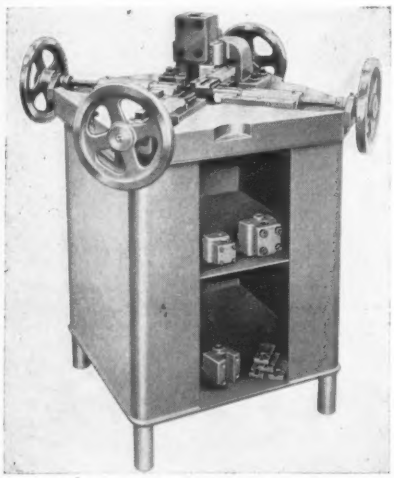
Write **Heil Process Equipment Corp.**, 12901 Elmwood Ave., Cleveland 11, Ohio, for Bulletin B-500.

Tool Tryout Fixture for 4-Slide Machines

A. H. Nilson Machine Company, Shelton, Conn., has announced their new No. 00-2 Tool Tryout Fixture for use in the design and building of tooling for 7 Models of Nilson 4-Slide Machines.

* * *

The No. 00-2 fixture is mounted on a welded pedestal base, with the standard fixture consisting of four screw-actuated slides operated by a 10″ diameter handwheel at each



Tool Tryout Fixture

slide. A center form bracket accepts five sizes of center form holders.

* * *

A No. 1 4-Slide post and holder, suitable for trying out tooling for No. 1 and No. S-1-F 4-Slides are supplied. Included are forming slides equipped with tool holder adapters suitable for 4-Slide Machines Nos. 0 through S-2-F. Other accessories are available.

* * *

This fixture enables the toolmaker to do his tool testing and sample making in the fixture rather than stopping production on a 4-Slide Machine in order to try out his tooling and also make samples.

* * *

For complete information and prices on the fixture and accessories, write A. H. Nilson Machine Company, 1000 Bridgeport Ave., Shelton, Conn.

Pangborn Forms Vibratory Finishing Division

Pangborn Corporation, Hagerstown, Maryland, manufacturer of blast cleaning, abrasive and dust control equipment, has announced the establishment of a new Vibratory Finishing Division.

* * *

The new division, located at the company's Hagerstown headquarters, is headed by **William E. Brandt** who has been appointed a Pangborn Division Manager. Mr. Brandt is a widely known authority on precision finishing.

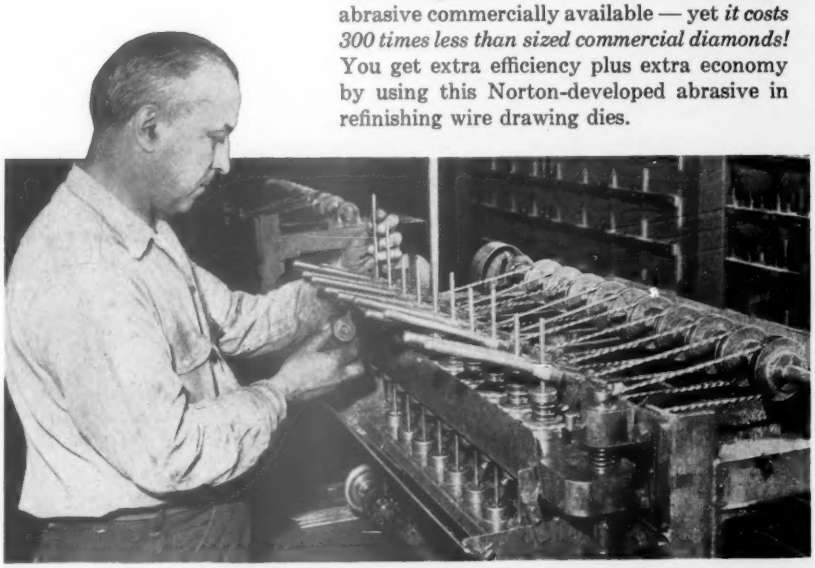
* * *

To launch its new division Pangborn has designed a new line of finishing machines and will soon announce details on exclusive features said to effect significant improvements. All of the Pangborn machines are based on the principle of air cushioned vibration which, among its other advantages, has proved its ability to speed precision finishing by up to one hundred times.

Next to diamonds in hardness...
First in economy...

NORBIDE abrasive for your die refinishing*

Next to diamonds and diamond dust NORBIDE grain is the hardest manufactured abrasive commercially available — yet *it costs 300 times less than sized commercial diamonds!* You get extra efficiency plus extra economy by using this Norton-developed abrasive in refinishing wire drawing dies.



Get more facts on how NORBIDE grain can bring high quality and steady savings to your die refinishing operations — including ripping, semi-finishing and sometimes finishing. For details and prices write to NORTON COMPANY, General Offices, Worcester 6, Mass.

NORTON
BORON CARBIDE

*Trade-Mark Reg. U. S. Pat. Off. and foreign countries

G-389

75 years of . . . Making better products . . . to make your products better
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

The West Coast Regional Meeting of . . .

THE WIRE ASSOCIATION

JUNE 9-10, 1960 — STATLER-HILTON HOTEL — LOS ANGELES, CALIFORNIA

TENTATIVE PROGRAM

THURSDAY, JUNE 9th

9:00 A.M. — Registration Starts.
10:00 A.M. — Meeting of the Association's Board of Directors.
2:00 P.M. — Technical Session and Film.
6:30-7:30 P.M. — Cocktail Hour.
7:30 P.M. — Dinner. Door prizes given. After dinner speaker. Ladies invited to attend.

FRIDAY JUNE 10th

9:00 A.M. — Plant visit to American Brass Co.
12:00 Noon — Luncheon.
1:00 P.M. — Plant visit to K. H. Davis Wire and Cable Corp.

FOR THE WEEK-END

The Program Committee suggests two possible trips: 1) visit to Disneyland; 2) a week-end in Las Vegas.

A fine program and a good time is assured to those who attend. All wire men invited.

Full details will be published next month.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 MAIN STREET **STAMFORD, CONN.**

(ILLUSTRATED)
42" x 20" x 21"—(4000# cap.)

Heavy Duty
BREAK-DOWN REELS

1000#
2000#
4000#
} capacities

Rugged Design including patented DURA-CURL rim, and many other features necessary to provide the *Strength* and *Durability* needed for continued successful performance.

Also complete line of sizes of Modern High Speed Wire Drawing NO-CREV Spools and Reels for both fine and intermediate size wire.

Mossberg PRESSED STEEL Corporation
"Division of Wanskuck Co."
18 WEST ST., ATTLEBORO, MASS., U.S.A.

Telephone
Attleboro 1-0848

#103

ALUMINUM INGOT AND MILL PRODUCTS AND MAGNESIUM MILL PRODUCTS: OCTOBER 1959

(Shipments and receipts are in thousands of pounds)

Item	Number of companies reporting shipments	October 1959			September 1959 net shipments	October 1958* net shipments
		Gross[1] shipments	Receipts[2]	Net[3] shipments		
ALUMINUM PIG AND INGOT, TOTAL	82	228,770	97,798	130,972	127,039	93,372
ALUMINUM MILL PRODUCTS, TOTAL	160	306,113	19,272	286,841	262,749	254,326
Sheet and plate, non-heat-treatable	28	117,294	12,854	104,440	94,528	91,631
Sheet and plate, heat-treatable	4	(D)	(D)	16,635	14,999	19,332
Foil, including foil in lamination	13	23,169	...	23,169	21,199	19,468
Rolled, and continuous cast, rod and bar	6	16,129	5,517	10,612	9,587	8,485
Wire, bare, conductor and nonconductor	15	5,627	119	5,508	5,140	4,530
ACSR and aluminum cable, bare	12	(D)	(D)	16,023	14,672	13,663
Wire and cable, insulated or covered	13	(D)	(D)	6,083	6,031	5,277
Extruded shapes, alloys other than 2000 and 7000 series[5]	104	87,994	478	87,516	81,720	75,270
Extruded shapes, alloys in 2000 and 7000 series	9	3,528	...	3,528	3,520	4,352
Drawn tube, alloys other than 2000 and 7000 series	12	4,769	...	4,769	3,705	4,949
Drawn tube, alloys in 2000 and 7000 series						
Welded tube, non-heat-treatable	6	1,238	...	1,238	841	757
Powder and paste:						
Atomized	3	995	...	995	674	474
Flaked	5	(D)	(D)	398	310	369
Paste	5	1,304	...	1,304	1,445	1,320
Forgings (including impact extrusions)	16	4,623	...	4,623	4,378	4,449
MAGNESIUM MILL PRODUCTS, TOTAL	10	(D)	(D)	2,220	2,288	1,983

D Withheld to avoid disclosing figures of individual companies. These figures are included, however, in the appropriate total.

[1]Gross shipments of mill products represent total shipments by producers to customers, including other producers, and shipments by producers to their own fabricating departments which manufacture products beyond the level of mill shapes. Ingot gross shipments include shipments by importers.

[2]For mill products, represents receipts from domestic producers only. In addition to receipts from domestic producers, quantities of mill shapes were received through imports. It is not possible to publish this quantity for October 1959, however, without revealing the operations of individual companies. For ingot, receipts from imports are included.

[3]For mill products, derived by subtracting the sum of producer's domestic receipts of each mill shape from the industry's gross shipments of that shape. Ingot data derived by subtracting all receipts from shipments reported.

The ALL-NEW FEDERAL

15,000 VOLT ELECTRONIC SPARK TESTER

•

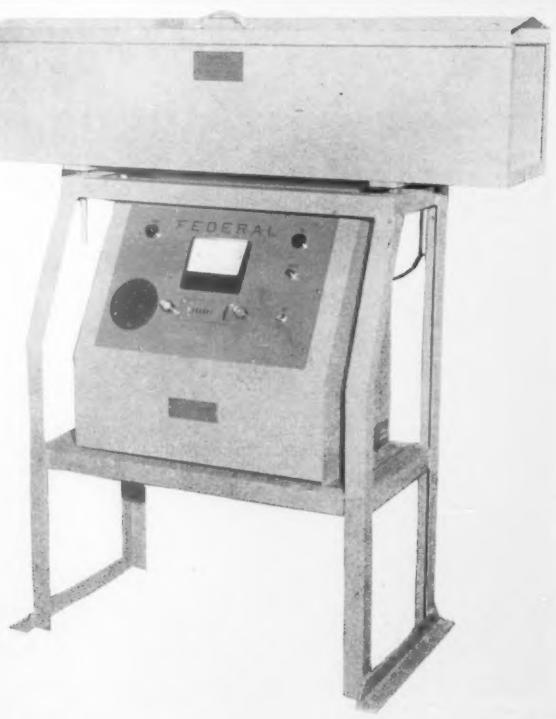
FOR ALL TYPES OF ELECTRIC WIRE AND CABLE

SPEED DETERMINED BY ELECTRODE LENGTH

Features

- CONTROLLED MA OUTPUT
- HIGH SPEED FAULT DETECTION
- HIGH SENSITIVITY

The Model CVE shown is for use with Extruding Machines
For Further Information Write Box 36



THE FEDERAL MANUFACTURING CO. WALLINGFORD, CONN.
WIRE MACHINERY • TESTING EQUIPMENT

FEDERAL 15,000 Volt Model CVE
Other Models 5-10-15-30-50 K.V.

LOW COST **precision wire plating**

MAINTAIN UNIFORM COATINGS AT HIGH SPEEDS!

CONTINUOUS
ELECTROPLATING
EQUIPMENT

This low cost equipment performs with ease and efficiency that mean real savings. Preset quality control insures perfection without depending on operators' skill. No toxic fumes, clean operation at low temperature, elimination of work hardening during processing and many other features are the result of experience and sound engineering that go into the design of all Universal equipment.

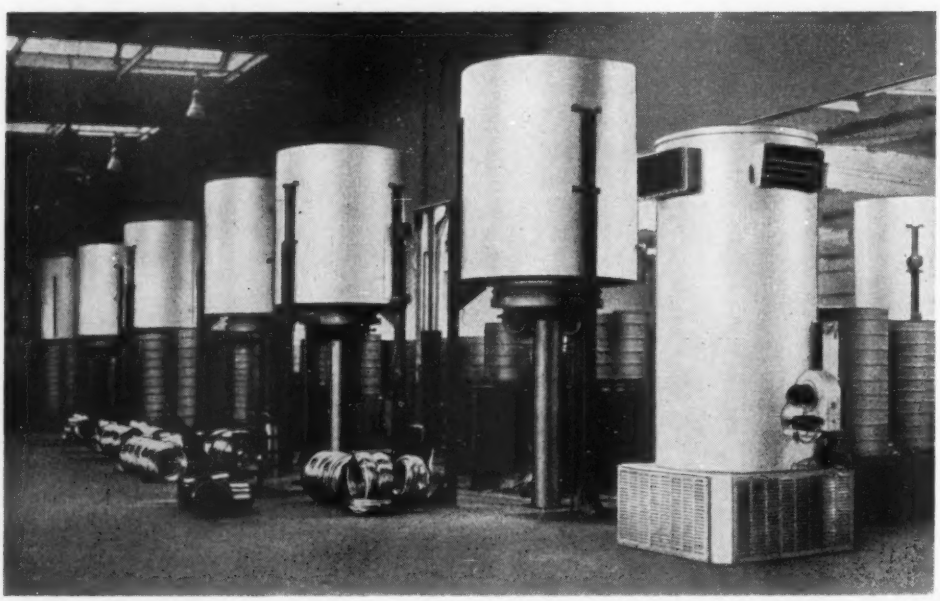
We furnish complete installation . . .
For further information write to:

UNIVERSAL INDUSTRIAL EQUIPMENT CO.

UNIVERSAL INDUSTRIAL EQUIPMENT CO.
SECAUCUS, NEW JERSEY SOLE AGENT IN CANADA: E. V. LARSON CO., LTD., TORONTO, CANADA

U. S. PATENT # 2823180 AND FOREIGN PATENTS PENDING

THE LAST WORD IN MODERN EFFICIENT DESIGN!



SEVERAL VACUUM BRIGHT ANNEALING UNITS WHICH WE HAVE INSTALLED IN ONE OF THE MOST PROMINENT CABLE WORKS IN GERMANY

(German and Foreign Patents)

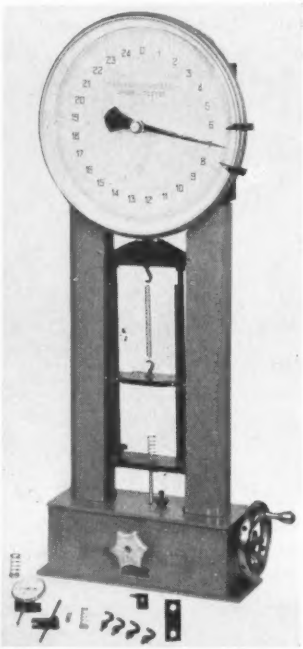
*

SOLE REPRESENTATIVE:
PAUL REICHER
Machinery & Equipment
600 Eglington Ave., East,
Toronto 12, Ont., Canada

OFENBAU FRITZ G. m. b. H. & Co. K. G. HAGEN, (W.-GERMANY)

Improved Light Load Spring Tester

New improvements to this precision spring tester increase its ability to check the loads of small compression and extension springs such as are extensively used in instruments, computers and missiles. Accessories consisting of a dial indicator and brackets can be applied to measure deflections in thousandths of an inch. Adjustable stops permit rapid production testing for loads and lengths up to 750 tests per hour. Dead weights in fractions of an ounce, grams or decimals of a pound are available. The capacity is ⅛ oz. to 25 lb.,



with spring lengths up to 5 in. and spring diameters up to 1¾ in.

* * *

A Bulletin is available from **The Carlson Co.**, 3457 Weidner Ave., Oceanside, L. I., N. Y.

New Caterpillar Capstan

A new general purpose Caterpillar Capstan for large diameter wire and cable insulating lines has been announced by **Davis-Standard, Div.** of Franklin Research Corp., Mystic, Conn.

* * *

The new capstan, Model MDC, is rated for 2,500 pounds pulling capacity at speeds up to 250 feet

Niederrhein, Europe's largest wire rod facility with its completely modern installations assures close tolerances for diameter and out-of-round, excellent surface and light scale.

NIEDERRHEINISCHE HUTTE AG
DUISBURG GERMANY

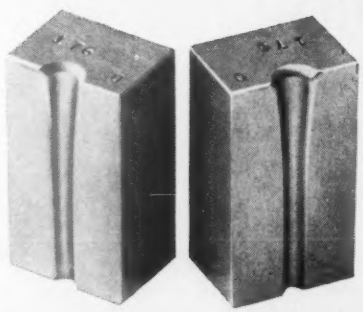
KURT ORBAN COMPANY, INC.

34 A Exchange Place, Jersey City 2, N. J.
In Canada: Kurt Orban Canada, Ltd., Toronto, Montreal, Vancouver

Thomas (Basic Bessemer) grades
low metalloid rods
open hearth from C 1005 – 1090
sizes from .200 – ⅞
coils from 180 – 880 lbs.
inside diameters 20, 24, 26, 33⅓"
Compressed bundles of 3000 lbs now available on request.
Reliable delivery schedules at a fair price.

Sjogren POINTING DIES

SJOGREN Pointing Dies have proven themselves! Made from shock-resisting high grade steel they assure many hours of hard, continuous usage. Fit your swaging machines with these rugged, S & S Pointing Dies, made to order on your specifications, they guarantee you service.



SINCE S&S 1927

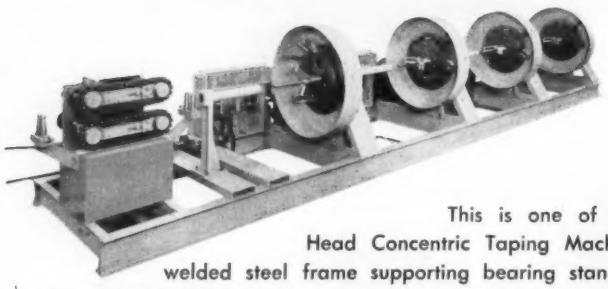
Used by Wire Men
Who Want the Best!

Sjogren SINCE S&S 1927
TOOL & MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 Sword St.
AUBURN, MASS.

FOUR-STATION CONCENTRIC TAPING MACHINE for ELECTRIC CABLES



This is one of EDMANDS' Multiple Head Concentric Taping Machines. Has one-piece welded steel frame supporting bearing stands for taping heads and supports for the capstan.

Driven by v-belt from Louis Allis Adjusto-Speed Drive for slow starts and speed variation. Capstan is tractor type, using change gears to control rate of lay.

Taping heads mounted in ball-bearing pillow blocks. Any head can be clutched out at will. Tape pads also mounted on ball-bearings. Heads fitted with electrical stop motions that operate at end of package or if tape breaks.

Heads accommodate pads of 12, 16, 18, 19, 22 or 24 in. dia. and 3/8" to 4" in width. Supplied with as many heads as needed.

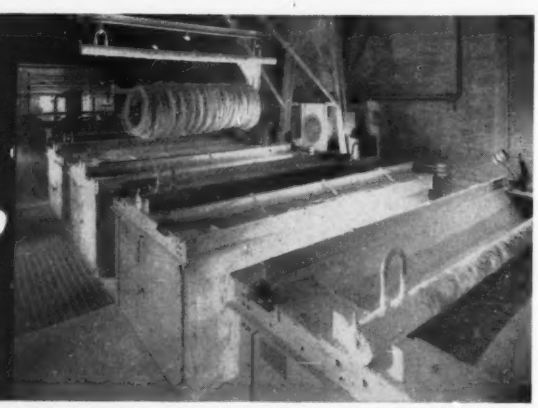
FULL DETAILS SUPPLIED UPON REQUEST

THE EDMANDS COMPANY

860 WELLINGTON AVE. CRANSTON 10, R. I.

carl mayer

HI-SPEED REGISTERED ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,323,828
2,235,559
Canada 396,144
401,589

THE carl mayer CORP.
20800 CENTER RIDGE RD., CLEVELAND 16, OHIO

OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

per minute. The special tread design provides a "wrap around" grip on cables from 5/16" to 5" diameter.

* * *

Pneumatically controlled tread pressure up to 400 PSI is available on only 70-75 pounds of air and extremely low air consumption is an outstanding feature of the capstan. Upper and lower treads open and close on a common centerline for precise horizontal alignment.

* * *

Shallow angle of treads at entrance end prevents damage of cable insulation. Horizontal and vertical guide rollers provide positive centering of cable in tread. A

Model MDC

Lead Wire drum capstan is available as optional equipment for starting cable through the capstan treads.

* * *

Complete details on the Model MDC Caterpillar Capstan are available on Davis-Standard Catalog Section 7.6.

New Carboloy Die Catalog

The Metallurgical Products Department of General Electric Co., Detroit 32, Mich., has published a new catalog of its Carboloy Cemented Carbide Die products.

* * *

It covers round and shaped dies, mandrels, bushings, discs, cylinders, balls, rods, nail grippers, diamond cones and wheels and other products.

* * *

Copies may be secured by writing the company for Catalog D-160.

Wire Rope Practices at The Scripps Institution of Oceanography

(*Continued from page* 333)

sion can be applied.

* * *

An emergency short splice known as the "Chicago Tie" has been adopted which enables an 8-10 foot splice to be made in large diameter rope with no increase in rope diameter. This is a modificaton of an 8-strand splice; it can be performed quickly and in a restricted space. Tensile tests indicate that the "Chicago Tie" has satisfactory strength.

* * *

On Downwind, gravity corer and bottom camera lowerings with the hydrographic winch when the wind velocity on station was 15 knots or greater, the standard procedure was to maneuver the ship into the wind and sea and "steam on station." This technique worked well only if steaming was commenced before the equipment was launched and maintained carefully throughout the entire time of lowering. It was observed that if this procedure was followed, bottom contact could be made with an excess wire payout of usually less than 7 per cent greater than the corrected depth. In cases where the ship was not maneuvered but simply placed with the wind and sea on the starboard side, bottom contact was ordinarily made with less than a 7 per cent excess over corrected depth provided the surface wire angles were small (less than 15 degrees). Of the approximately 180 lowerings with the Baird hydrographic winch, nine resulted in wire tangles sufficiently serious to necessitate cutting back the free end. Six other tangles were of a minor nature. These tangles resulted from excess wire being coiled on the bottom after a bottom signalling misfire, and in most cases occurred when more than 7 per cent in excess of the corrected depth was paid out.

* * *

A serious problem arises in the retrieving of equipment when the rope above it has been snarled and tangled. Not only can this

HEAVY COIL WRAPPING MADE EASY WITH LARMUTH'S NEW 12" MACHINE

Now Glues The Paper As It Wraps

12" MACHINE

A LARMUTH *Spiral Wrapping* MACHINE

WITH PATENT MECHANICAL LOADING AND EJECTION

FOR COILS UP TO 12" WIDE

PUSH BUTTON CONTROLLED

LARMUTH *of England*

U.S.A. Agents: Machinery & Machine Supplies Co., Inc.
305 East 47th St.,
New York 17, N. Y.
Telephone: Plaza 8-0744-5-6-7

LARMUTH (1947) LTD., BROOK STREET, KNUTSFORD, CHESHIRE, ENGLAND
Telephone: Knutsford 2244/5

AT YOUR SERVICE

*

SPECIALIZED ENGINEERING
SPECIALIZED EXPERIENCE
SPECIALIZED MACHINERY
FOR
TWISTING • STRANDING • BUNCHING
Continuous Tension Control
For Precision-Quality

*

HASKELL-DAWES
MACHINE CO., INC.
2231 E. Ontario Street
Philadelphia 34, Pa.

CAMDEN WIRE CO., INC.

Wire Fabricators

PRODUCERS OF QUALITY FINE WIRE
COPPER CONDUCTORS

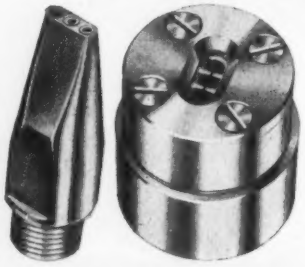
SOLID • BUNCHED • STRANDED
OR BRAID

BARE • TIN OR LEAD COATED
AND SILVER PLATED

"Prebond"

CAMDEN WIRE CO., INC.
40 MASONIC AVENUE • CAMDEN, NEW YORK

INSULATING DIES AND NOZZLES
for
EXTRA-HIGH ELECTRIC WIRE PRODUCTION



CARBIDE EXTRUSION NOZZLES OR TIPS FOR ALL MACHINES.

CARBIDE AND STEEL

Highest quality of workmanship and materials. Standard Types and Special Dies and Tips to your order.

CENTRAL CARBIDE NOZZLES have phenomenally long life; will lower operating costs and reduce wire breakage.

CENTRAL STEEL DIES are made in Round, Figure 8, Serrated, Tracer, and other special shapes to your specifications.

A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed, and the whole reassembled easily and quickly. Made for 2 and 3 conductor wires to be coated in extrusion machines.

Write for folder or phone for information
WIRE TOOL DIVISION
CENTRAL TOOL AND MACHINE CO.
Formerly BRIDGEPORT JIG BORING COMPANY
102 CENTRAL AVENUE, BRIDGEPORT 7, CONN. TEL.: FOREST 7-8473
Export Dept. ANDOVER INTERNATIONAL INC., P.O. Box 29, Bayside 61, N. Y.
CABLE Address ANDONIK
LEADER IN HIGH PRODUCTION EXTRUSION TOOLS FOR ELECTRIC WIRE

happen in coring as on Downwind, but in certain trawl operations where the cable may pay out faster than the trawl, thus throwing slip knots into the line.

* * *

If, in the case of coring or dredging, where the festoons of rope are over the side and at the bitter end above the gear, the winch is stopped with the festoons almost at the head sheave. Cable grips are applied to the rope below the knot holding the load at that point and the rope is then slacked off the winch. The process of pulling the line free is the same for pulling knots out of shoelaces, except that a marlinspike is used to get to the core of the knot. As the knot is unravelled, slack must be slowly and continually pulled by the winch. Usually, a key knot will be found inside the festoon winch, if pulled first, will save considerable time and trouble.

* * *

Care must be exercised in reeving the ensuing kinks over the sheaves and onto the winch drum. Kinks, even when flattened, tend to make the rope unstable and will concentrate stress and will be the focal points of future abuse.

* * *

Winch operators must be trained to properly break in a rope and to handle it with care at all times. Too rapid acceleration will intensify stress as will jerkey and spasmodic hauling. Because of the lack of automatic tensioning devices on most oceanographic winches, attention must also be paid to the development of large stresses due to roll and pitch of the ship while on station. The payout and inhaul speeds must be smoothly adjusted to compensate for these loads to prevent instantaneous takeup of slack by the drum.

* * *

This work has been supported in part by the Office of Naval Research.

Our Advertisers are Reliable
Patronize Them

Federal Manufacturing Co. Expanding Plant Facilities

Federal Manufacturing Co., 193 South Cherry St., Wallingford, Conn., has announced the purchase of a larger factory building, to provide more space for its manufacture of machinery and equipment for the wire and cable industry. The new facilities are being remodeled for early occupancy. The new plant will provide ample space for the company's expanding engineering and production operations.

* * *

At the same time Thomas L. Holmes, President, announced that the entire Federal line of machinery and testing equipment has been redesigned and engineered to meet today's higher speed and quality requirements in the production of insulated electric conductors.

* * *

Federal equipment is in use throughout the world by major electric wire and cable manufacturers.

A Pre-Production Test for Acid Inhibitors

(*Continued from page* 327)

1000 ml standard beaker will maintain the 300 ml of acid under test at a temperature which is constant within ± 1°F if the water is kept boiling in the jacket. The Phillips beaker is held suspended in the water jacket by means of a utility clamp on a ring stand. Other temperatures may be used but then more elaborate equipment may be needed. An appropriate thermometer is placed in the acid.

* * *

The steel samples to be immersed in the acid solution are cut to a constant length. Our samples are cut to a length which provides 10 square inches of test surface (the edges are disregarded). Preparatory to the actual test, the constant length samples are bent slightly to prevent close contact with the beaker, cleaned in carbon tetrachloride and then prepickled for 60 seconds in boiling sulphuric acid (9.0% by volume 66° Be). The pickled samples are washed in water, dried and stored in a dessicator. The pre-

FREE

from your headquarters for

Spiralwrapping

☐ New facts sheet "W Series Machines"
Versatile. For coils from 2 to 2000 lbs., from 18"-30" O.D. and 24"-40" O.D. Also for straight lengths.

☐ New facts sheet "U Series Machines"
New custom features! For wire, plastic, etc., from 24"-107" O.D. Also for straight lengths.

☐ New facts sheet "Tension and Folding Devices"

☐ New sample book "Ludlow Spiralwrapping Papers"

☐ New demonstration film in color. Ask for showing.

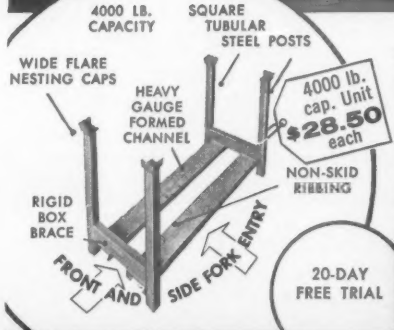
Check information desired and mail to Ludlow Papers, Needham Heights, Mass., Dept. 168

Ludlow

• MACHINES • DEVICES • PAPERS • TECHNICAL SERVICE

JARKE
PORTABLE
WIRE COIL RACKS

COURTESY HOLO-KROME SCREW CORP.



Solve Wire Coil Storage Problems

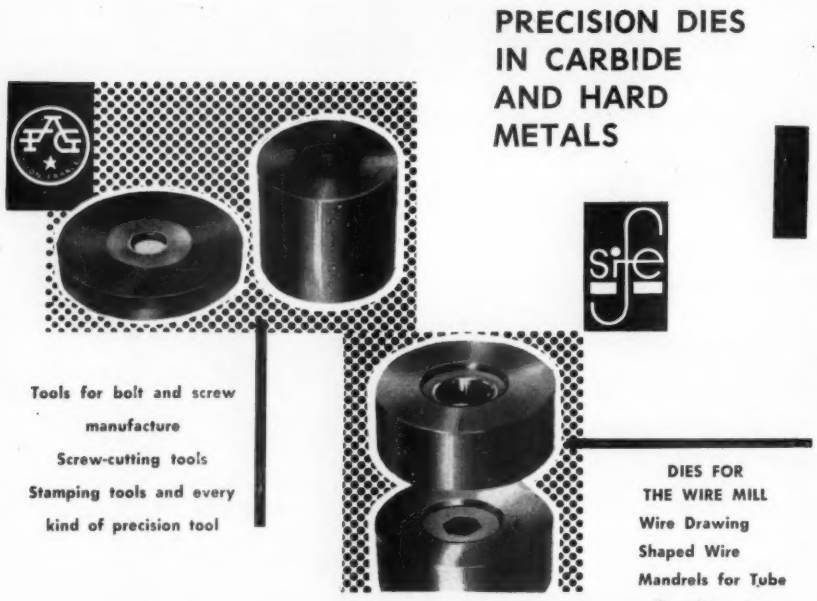
Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

20-DAY FREE TRIAL

JARKE MANUFACTURING COMPANY

Send for Details
6333 Howard St.
Chicago 48, Illinois

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE



rivom
DIJON FRANCE

P. O. BOX 169, DIJON
ROUTE DE TROYES

EQUIPMENT

Extruders
Takeup Equipment
Payoff Equipment
Spoolers
Respoolers
Measuring Machines
Capstans
Cable Strippers
Braiding Equipment
Twinners, Stranders, Cablers, Bunchers
Spark Testers
Printing Machines
Spiral Striping Machinery
Taping Equipment
Fine Wire Takeup and Respooling Equipment
Wire Drawing Machines
Specially Built Equipment
And Much More

SUPPLIES

Wire Drawing Dies
Wire Drawing Spools
All Types of Reels and Spools
Lithographed Spools
Inks for Printing Machines
Bare, Tinned and Silver Plated Copper Wire, Stainless Steel, Silver, Nickel, Bronze, Brass and Other Bare Wires
Numerous Other Items

all the wire industry in the West looks to 2 companies

First, there's Western Wire & Textile Machinery, Inc., the only company in the West that deals exclusively in used and reconditioned wire and cable-making equipment.

Secondly, there's the Paul I. Kenner Co., supplier and distributor of new wire and cable manufacturing machinery and supplies.

Nowhere else in the West will you have a better chance of finding exactly what you need---either new or used. Nowhere else in the West will you be able to trade in old equipment on new. Nowhere in the West will you find such a complete stock of machinery and equipment.

You'll like dealing with men who speak your business language---with companies backed by 20 years of highly specialized experience.

SOME EQUIPMENT ON HAND:

Takeups • Payoffs • Braiders • Asbestos Carding Lines • Taping Machines • 13 Die Copper Rod Breakdown Machine with Cook M-1000 Spooler Takeup.

2 Two companies that provide all that's needed, new and used for the West's wire industry.

WESTERN WIRE & TEXTILE MACHINERY, INC.
228 Shaw Road South San Francisco, Calif. Tel.: JUno 9-1101

PAUL I. KENNER CO.
228 Shaw Road South San Francisco, Calif. Tel.: JUno 9-1101

pickling must be done carefully otherwise the results obtained in the inhibitor test will be erratic.

* * *

300 ml samples of acid, with the recommended amount of inhibitor and without inhibitor are prepared. In turn, the acid samples are placed in the water jacket and allowed to come up to 208°F. A prepickled test sample is weighed and dropped into the acid. The time in acid is 30 minutes. Timing must be carefully done as 18 seconds corresponds to 1% of test time. When the time is up, the test sample is washed, wiped to remove carbon smudge, dipped in alcohol, dried in a dessicator and then weighed. A new steel sample is used each time.

* * *

The weight losses in the inhibited and uninhibited acids are then applied to the formula given earlier. Example:—

30 minute weight loss on 10 square inches of prepickled sample in uninhibited acid = 3.9530 grams

30 minute weight loss on 10 square inches of prepickled sample in inhibited acid = 0.0496 grams

$$\text{Efficiency} = \frac{3.9530 - 0.0496}{3.953} \times 100 = 98.74\%$$

* * *

The foregoing procedure may be varied to suit local conditions and preferences in regard to acid temperature. As a check on stability of an inhibitor, an acid sample can be taken from an operating tank or a new inhibited acid sample may be held at a predetermined temperature for a predetermined length of time before running the efficiency test.

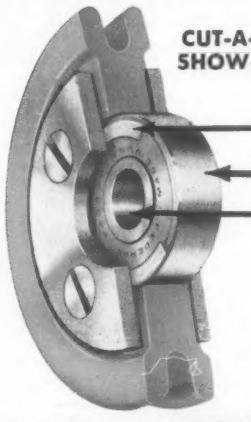
* * *

Correlation between the laboratory tests and full production tests of inhibitors has been very good. It is a standard practice at Roebling to screen all inhibitors by the laboratory method. It should be noted that the inhibitor efficiency determined by this method does not consider cost. Cost determinations are made on a separate basis after efficiency is determined.

WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE WITHOUT WEAR OR DAMAGE

HEANIUM®
PU2-F PULLEY

CAN BE RUN AT TEMPERATURES ABOVE 200 F. WITHOUT BEARINGS LOOSENING IN PULLEY.



Heanium® Pulleys outwear their bearings, but the bearings are easily replaced.

If guide wear is a problem in your mill . . USE HEANIUM®

HEANY INDUSTRIAL CERAMIC CORP.
P. O. BOX 530 NEW HAVEN 3, CONNECTICUT

For Real Economy Use

Wire Dies For
Stranding
Bunching
Re-Spooling
R-3

Tinning
R-3T
R-3G

HEANIUM® DIES — economical when used for applying heavy coat OF TIN TO WIRE. Tin does not adhere to polished Heanium®. Can be used in place of more costly materials for heavy tinning, offering great saving. HEAT OR ACID HAS NO EFFECT ON HEANIUM®. Available mounted or unmounted. Rough cored or finished to size. Easily recut on standard die equipment in a fraction of the time required by other materials.

Physical properties:
Absorption — 0.00.
Rockwell C hardness — 70 to 72.
Safe operating temperature (C) — up to 1600°.

TRY THEM — ORDER NOW
HEANIUM® DIES are manufactured exclusively by

ROUX WIRE DIE WORKS, INC.
ORISKANY, NEW YORK
Tel. REdwood 6-2373 - Utica, N. Y.

G.E.'s New Unitized Motors

Four page illustrated technical bulletin discusses features and points out basic advantages of General Electric 33-frame Unitized* motors.

Illustrated bulletin gives electrical performance and dimensions of the new Unitized two-pole, 33-frame, shaded-pole motors. Two basic versions of the motors are described and applications for the Unitized motors in ratings of 1 through 20 millihorsepower are listed. Tentative selection guide is included.

Technical bulletin contains charts indicating Unitized motor relative sound level, sound frequency, wear-friction and temperature effect on starting. Write General Electric Company, Schenectady 5, N. Y. for a copy of Bulletin GED-3876.

* Trademark of General Electric Company

Special Types of Carew Cutters

BT special temper jaws are harder than usual but also more brittle. To be used for cutting hardened wires and larger size music wire. Our standard jaws will cut music wire to .010".

* * *

Thompson type jaws are extra sharp. They are for cutting aircraft cable and other fine stranded wire, with minimum distortion. However, they will not hold up cutting hard single strands or music wire.

* * *

Flush cutting jaws have only 1/3 the top bevel used on our standard jaws. They are used for cutting up flush to surfaces, cutting rivets and other materials. They are apt to be a little softer than our standard jaws and are not recommended for music wire.

* * *

GE overhanging jaws are longer than the head of the nipper and overhang on one or both sides. They are used in tight places where the head of our nipper can't fit. They are popular with transformer winders.

* * *

M. W. Robinson Company, manufacturers of Carew Nippers will be glad to learn of your wire cutting problems and recommend the most efficient cutter for a particular use.

REPUBLIC
FLANGED STEEL TRAVERSES

- *SAVE TIME!*
- *SAVE LABOR!*
- *SAVE MONEY!*

Republic Flanged Steel Traverses feature a simple 4-way assembly — no special tools required, long trouble-free service, stack and store in minimum area. Just assemble it and forget it!

Reinforced where it counts—at the flange base and bolt holes. Makes possible the use of lighter gage steel. Reduces unit weight 20%. Highest strength-to-weight ratio possible.

Three different finishes—plain, painted, and hot dip galvanized. Meet all cable requirements. Flange width and bolt holes furnished to your specifications. Choose from the industry's most complete line. Send coupon below.

REPUBLIC STEEL CORPORATION
BERGER DIVISION
DEPT. C-9096
1144 BELDEN AVENUE • CANTON 5, OHIO

Please send information on Republic Flanged Steel Traverses.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

New Galvanizing Department at Gilbert & Bennett's Blue Island, Illinois, Plant

(*Continued from page 348*)

On the lead pot, the heat transfer for a 1250 degree lead temperature is limited to 15,000 Btu. per square foot per hour. This is accomplished with radiant transfer without having any overheated areas on the pot itself. On the galvanizing pot, the limitation is 10,000 Btu. per square foot per hour.

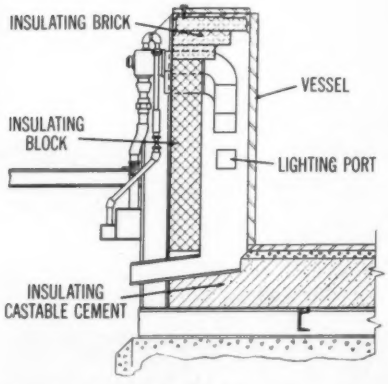


Figure 5—Burner layout for galvanizing pan setting.

* * * * * * * * *

The lead pan is 20 feet long and the galvanizing pan is 10 feet long. The pan widths are 3'0" and in depth, the lead pan is 12" while the galvanizing pan is 3'6" deep, but the setting is arranged so that a deeper pan can be used in the future.

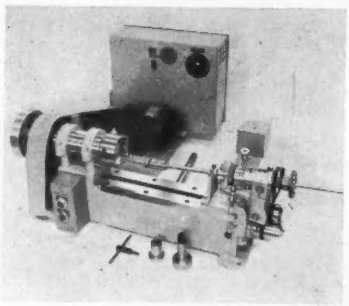
* * *

As can be seen from the various photographs, the whole installation is extremely well laid out and presents a neat and clean appearance that commands the respect of the operators. Two men are used per turn to handle this entire layout.

Plastic Wire and Cable Promotions

Marvin H. Phillips, President of **Plastic Wire and Cable Corp.,** Jewett City, Conn., has announced the promotion of six men, each of whom has held key executive positions in the company. For the past 13 to 15 years each one has played an important role in the development of the business. Mr.

NEW *from* DYKREX



MODEL 'MXO' automatic
DIE SERVICING and REFINISHING MACHINE

AC-DC Speed Regulation
Lapping to Finishing Without Removing Die Casing from Machine

Up to 6" Die Casing Capacity

Bed Lengths 24" to 36"

SAVE UP TO 50%
In Time • Labor • Production

write for prices and literature
DYKREX CORPORATION
17-19 Grove St., Montclair, N.J.

The 1960 Edition

of the

Wire & Wire Products

BUYERS' GUIDE

will be off the press on

MAY 1, 1960

- COMPLETELY REVISED
- MUCH NEW INFORMATION
- A VERITABLE TREASURE-TROVE OF BUYING INFORMATION
- AN INDISPENSABLE HANDBOOK FOR ALL WIRE MEN

—•—

Besides giving sources of machinery equipment and supplies used in the Wire Industry, it lists all types of ferrous and non-ferrous products made by the mills, including electric wire and cables.

—•—

In the YEAR BOOK section will be found additional valuable information, as

- HISTORY OF WIRE ASSOCIATION ACTIVITIES IN 1959.
- THE ASSOCIATION'S BY-LAWS.
- OFFICERS AND DIRECTORS.
- ASSOCIATION MEMBERS BY INDIVIDUALS AND COMPANIES.
- INDEX TO ARTICLES AND SUBJECTS PUBLISHED IN 1959.
- AWARDS PRESENTED FOR MERITORIOUS PAPERS.

PRICE: $5.00 EACH; $3.00 TO SUBSCRIBERS

ORDER YOUR COPY TODAY FROM

WIRE AND WIRE PRODUCTS

453 MAIN STREET

STAMFORD, CONN.

Phillips made the announcement of the well-deserved promotions in behalf of the Board of Directors.

* * *

Effective February 1st **Herbert W. B. Farr** was promoted from Vice President and Sales Manager to Executive Vice President; **James T. Daly** from Assistant Sales Manager to Vice President and Sales Manager; **George H. Lane** from Assistant Treasurer to Treasurer; **James E. Flood** from Technical Director to Vice President and Technical Director; **Gordon H. Sigman** from Purchasing Agent to Vice President and Purchasing Agent; **J. Vincent McBride** from Chief Engineer to Vice President and Development Director.

New Wire Plant in North Carolina

Robert H. Kemper, President, **Carolina Wire & Cable, Inc.,** has announced the opening of a new wire mill at West Horne Ave., Farmville, N. C.

* * *

The enterprise is affiliated with the **Owl Wire and Cable Company,** Syracuse, N. Y. of which **Harold Epoch** is president. Mr. Kemper is also Vice President of Owl.

* * *

The new company will draw, bunch and strand electric conductor wire for the manufacture of insulated wire and cable. All machinery has been installed and is now in operation. When in full swing, the company expects to employ about 50 people.

Announces Aluminum Oxide Coated Wire and Strip

Permaluster, Inc., has announced the availability of wire and strip insulated with an anodized flexible aluminum oxide coating. Wire coatings will withstand temperatures to 1900°F and strip coatings to 1100°F. These are made by the Permaluster continuous anodizing process for high temperature wire for aircraft missile and the electronic industries. Coatings will withstand deformation without fracturing or crazing the film, which can be made to be .00008" to .001" thick, as desired.

* * *

Six *advantages from just* One *dip!*

and ONE DIP *is all that is necessary for coating wire and steel rods . . .*

good acid neutralizing

faster butt welding

better working conditions

longer storage with safety

rust inhibitor coating

longer die life

you get them all with . . .

BORAX 5 MOL.

BORAX 5 MOL offers worthwhile advantages over regular borax as a satisfactory coating material on ferrous rods and wire in preparation for dry drawing. This newer material offers a higher concentration of sodium borate and therefore savings may be realized through reduced transportation, handling, and storage costs. Only about three-fourths as much Borax 5 Mol need be used to equal regular borax . . . yet you get the same worthwhile results!

Write to our Technical Department for further information

UNITED STATES BORAX

& CHEMICAL CORPORATION

50 Rockefeller Plaza, New York 20, N. Y.
630 Shatto Place, Los Angeles 5, Calif.

ENJACD

100 GLEN ROAD
CRANSTON 10, R.I.

JAMES L. ENTWISTLE
PRESIDENT

THE SYMBOL OF EXCELLENCE IN WIRE
PROCESSING AND TESTING EQUIPMENT

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .250"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.
Dental and Surgical Wires, large assortment.

THE MALIN & COMPANY

2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

STANDARD

MOLDED WIRE BRAIDER SPOOLS

SMOOTH SPOOL HEADS will not break, warp, knick or rough-up—reducing maintenance costs. The instant locking feature saves time locating "dog-hole". Lighter than metal spools with less wear on Braider and Winder.

Contact us regarding your Spool Problems.

Stocked and sold exclusively by
STANDARD MILL SUPPLY COMPANY
31 ESTEN AVE., PAWTUCKET, R.I.
Telephone, PAwtucket 3-1534

WIRE DRAWING MACHINERY
AND EQUIPMENT

FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE
Wire Blocks Made To Suit Your Needs

WRITE FOR PRICES

SUPERIOR TOOL & MANUFACTURING CO.
SHREWSBURY STREET WEST BOYLSTON, MASS.

With its melting point of 3800° F., aluminum oxide gives excellent protection to metal strip in products like transformers, without cooling. It also provides space savings of as much as 50% in electronic applications. The coating can also be applied to other metals, as to nickel plated copper or silver.

* * *

A technical bulletin on the process is available by writing Permaluster, Inc., 2012 W. Burbank Blvd., Burbank, Cal.

Wire Company Bought by Cable Corp.

The merger of the **International Wire Products Corp.,** Midland Park, N. J., and the **Carlisle Corp.,** Carlisle, Pa., was announced jointly on January 4, 1960, by **Anthony J. Rizutto,** President of International, and **George F. Dixon, Jr.,** President of Carlisle.

* * *

The company will continue to operate as a wholly owned subsidiary of Carlisle, with no changes in present officers, personnel or policies. Since its founding 15 years ago, International has gone through six expansions of facilities and has grown into a multi-million dollar organization as a producer of electrical conductor and many other types of specialty wires.

New Wire Enameling Die Sizing Service

Mohawk Development Service, Inc., has established a service facility for initial sizing and for resizing of holes in wiper type dies used in the wire enameling process. This service is offered for those die users whose requirements are too small to justify establishment of wire sizing die facilities in their own plant. The service is offered also as a supplement to existing die shops to accommodate peak load or rush orders for finished holes.

* * *

For full details regarding the service, write Mohawk Development Service, Inc., 502 State St., Schenectady 5, N. Y., asking for Bulletin MPD-135.

To Install New Rod Storage System

The management of the **Colorado Fuel & Iron Corporation** has announced that it is to begin work on a major project involving improvement of the rod storage facilities at the Palmer Massachusetts Plant.

* * *

The project requires clearing the present rod yard site, removing and relocating sections of railroad track, grading the area, pouring concrete pads and erecting steel supports to allow rod bundles to be stored in a vertical position.

* * *

The alterations to the rod storage area will eliminate any possibility of damage due to pyramiding of rod bundles and exposure to rust caused by storing rods on wet earth or cinders, thereby safeguarding the quality of rods. Rod storage also will be increased.

An Analysis of Extrusion Screws

(*Continued from page* 325)

b. Select a reasonable value of d_2 for a point immediately beyond the feed port and calculate D_{P2} from the formula. (Section 2f. above).

c. Lay a straight edge between V_2 (per flight) (at a point immediately beyond the feed port) and the calculated value of D_{P2}. Pivot on A until straight edge passes through d_2 (selected value). Read w_2 and compare with value of predetermined value of w_2.

d. Select a better value of d_2 and determine its w_2 value continuing this process until d_2 has been established and D_{P2} and D_{R2} calculated.

5. Using Nomogram I
Determine Θ by laying a straight edge between value of D_{P3} and the value of l_3 at the extrusion end. Read Θ where straight edge crosses scale Θ.

6. Calculate N (min.)
From formula

$$N\ (\text{min.}) = \frac{W_A\ (\text{min.})}{W_A\ (\text{max.})}\ N\ (\text{Optimum})$$

* * *

Screws designed using the criteria discussed herein still contain the risk element always present when some of the considerations are based on empirical knowledge and the application of good judgment, but that risk is reduced to a minimum by the accurate mathematical interpretation of that judgment and knowledge.

The NEW WINDER
FOR
BRAIDER BOBBINS
AND
The NEW RE-SPOOLER
FOR
HIGH SPEED PRECISION WINDING
AND
PERFECT SPOOLING FOR ANNEALING AND ENAMELING OPERATIONS WITH THE FAMOUS ELECTRICAL "NO-DWEL" TRAVERSE FOR EXACT PITCH
ASSOCIATED AMERICAN WINDING MACHINERY INC.
750 ST. ANN'S AVE., NEW YORK 56, N. Y. 5935 W. GRAND AVE., CHICAGO 39, ILL.

FOR WET DRAWING AND CLEANING COMPOUNDS
SPECIFY
PERMAG
For more than 33 years, Magnuson Products Corporation has helped solve difficult wire drawing and cleaning problems at considerable savings.
Write, wire or phone today and find out how Magnuson can help you expedite production.
MAGNUSON PRODUCTS CORPORATION
50 COURT ST., BROOKLYN 1, N. Y. In Canada: Canadian PERMAG Products, Ltd., Montreal

FINE WIRES
Bare Annealed No. 36 A.W.G. and Finer
From Copper—Cadmium Copper—Bare and Silver Coated—Aluminum
For Stranding and Shielding
WRITE — WIRE — PHONE
THE MONTGOMERY COMPANY
25 CANAL STREET Est. 1871 Tel.: National 3-3336 WINDSOR LOCKS, CONN.

FORMULA FOR SUCCESS
IN SYNTHETIC THREAD AND YARN APPLICATION
SYNTHETIC THREAD COMPANY (YARNS+PROCESS+SERVICE)=$UCCESS∞
NYLON FORTISAN ORLON RAYON DACRON DACRON/GLASS ACETATE
EXACT CONSISTENT to GOV'T SPEC.
OUR PROUDEST ASSET ALL PUT-UPS STANDARD OR SPECIAL
IN APPLICATION BRAIDING·SERVING·IDENTIFICATION·BINDING·LACING·HI-STRENGTH FILLER

Write for Samples, Prices and Data desired
SYNTHETIC THREAD CO.
238 W. GOEPP ST., BETHLEHEM, PA. Tel.: UNiversity 8-8575

Wood's Ultra-V Drive Bulletin

Bulletin No. 9102, "Wood's Ultra-V Drives," gives 36 pages of useful information on a drive said to reduce overall drive dimensions by as much as 50%, save up to 25% in weight and save up to 30% in cost over conventional V-belt drives. Bulletin includes drive-selection tables for stock and non-stock sheaves, horsepower tables, nomograms for service-level comparisons of drive costs, sheave and belt specifications, bushing and keyseat specifications, installation instructions for "Sure-Grip" sheaves, information on how to check the tension of an Ultra-V drive, etc. For a copy write **T. B. Wood's Sons Co.**, Chambersburg, Pa.

Bulletin on Furnaces

Sunbeam Equipment Corp., 184 Mercer St., Meadville, Pa., has issued a bulletin, "Sunbeam Metal Minutes," giving general information on Sunbeam furnaces, applications and services, together with a list of its representatives throughout the United States. A copy may be obtained by writing the company.

New Data Sheets Published on Insulated Wire Equipment

The Enjaco Corp. has issued a folder containing data sheets on equipment manufactured by the company for electric wire and cable producers.

* * *

The sheets presently cover Spark Testers and Re-Reelers, Measuring Machines, Automatic Re-Reelers, Collapsible Coiling Reels, Pay-Off Stands, Hi-Pot Testers, Traverse Units, and Drying or Curing Ovens.

* * *

These sheets are immediately available. Others are being prepared to cover the 200 or so items made by the company, which include, among others, Spiral Striping Machines, Wire Preheaters, Printing Wheels & Inks, Capstans, Patching Presses, etc. When completed, the series will be combined into a general catalog.

* * *

For a set of those now available, or for particular data sheets, write **James L. Entwistle**, Pres., Enjaco Corp., 100 Glen Road, Cranston 10, R. I.

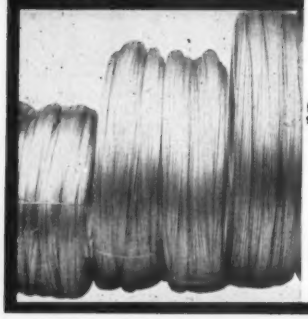
Durant Appointments

Durant Manufacturing Company, Milwaukee, Wisc., has announced the appointment of the **M. R. Snyder Co.**, 304 E. Tremont Ave., Charlotte, N. C., as the sales representative in North and South Carolina for the Durant line of instrument and industrial counters. The appointment has been made so as to provide additional service to Durant customers in this area. The company is staffed by factory trained personnel fully qualified to give assistance to any mechanical, electric or instrument counting problem. **"Flip" Snyder** and **Ernie Brown** head the team of Durant-trained personnel.

* * *

Durant also has announced the establishment of an authorized industrial counter repair center with

STAINLESS STEEL WIRE



Holds World's record for Productivity & Export

NAS

STAINLESS STEEL WIRE

Dia: 0.324" ~ 0.0016"

Capacity: 350 tons (monthly)

NIPPON STAINLESS STEEL WIRE MFG. CO., LTD.

HEAD OFFICE: NO. 47, UMEDA-CHO, KITA-KU, OSAKA, JAPAN.

COTTON YARNS

PRECISION WOUND ON WARDWELL TUBES AND NEW ENGLAND BUTT TUBES

WRAPPING AND SERVING YARNS • INSULATING YARNS
UNDERWRITERS' MARKER OR TRACER THREAD

CUSTOM WINDING — ANY PACKAGE — ANY NUMBER OF ENDS

Spot lots always in stock

CHADWICK YARN COMPANY

P. O. Box 591 — PAWTUCKET, R. I. PAwtucket 3-0641

WE BUY WE SELL

Stranders — 7-bay and 12-bay.
1 Davis Standard 48" Dual Capstan complete with Drive.
1 60" Royle Capstan.
1 #1-½ Cumberland Granulator.
2 Terkelsen Paper Wrapping Machines.
1 New England Butt 7-wire Planetary Upright Twister.

WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

An UNBEATABLE Combination

GEM GRAVURE CO.

MARKING MACHINES:
10 Models of Precision-built Markers for Printing, Striping or Embossing.
MARKING WHEELS:
NEW-Hardened Gravure wheels give years of service. Reproduction of any Type face or Trade-mark.
INKS:
For Hot or Cold applications in Navy-Chip Colors. Our inks have passed all present solvent and abrasion tests.
KNOW HOW:
Our staff of trained personnel, headed by Wire and Cable Engineers with a background of many years experience, stand ready for consultation on every marking problem.
MAIL: West Hanover, Mass.
TEL: Rockland, Mass. TRiangle 8-0456
West Coast Representative:
PAUL I. KENNER,
230 Shaw Rd., South San Francisco, California

the **Pacific Coast Instrument Co.**, 256 Mission St., San Francisco, Cal. The appointment is designed to supplement the sales, distribution and engineering services that are now available to Durant customers on the West coast. They will work closely with **Transmission Egineering Co.**, Durant's Northern California sales representative located in San Francisco.

38th Milan Trade Fair

13,500 exhibitors will display products of industrial, commercial and agricultural interest in the **Milan Trade Fair**, April 12-27 at Milan, Italy. The products of 50 nations will be exhibited.

* * *

Among the services will be a Foreign Visitors Reception Center, through which interpreter-guides will be supplied without charge.

* * *

Inquiries and requests for visitors' cards may be directed to the Commercial Office, Italian Consulate General, 666 Fifth Ave., New York 19, or any of the Italian Trade Commissioner offices that are located in the principal cities of the U. S. A.

Wire Firm Building New Plant

Construction on a new 12,000 square foot plant was started last December by the **Lewis Engineering Company**, Naugatuck, Conn. The new plant, located on North Spring Street, is scheduled for completion in May of this year.

* * *

The firm manufactures electric wire and cable and is a specialist in the production of thermocouple wire.

Alcoa Buys Rea Magnet Wire

The Aluminum Company of America has announced the purchase of **Rea Magnet Wire Company**, Fort Wayne, Indiana, a company organized in 1933, presently

Diamond Powders
Of First Quality Only

For assured quality, accurately graded diamond powders

Specify "DANFORTH"

WE BUY SWARF, SLUDGE AND LAPPING COTTON

RECLAIMING SERVICE
We also reclaim and return to you the diamond content, guaranteed 99% pure and graded for further use.

For particulars, write

C. W. DANFORTH CO.
101 E. Indianola Avenue
Youngstown 7, Ohio

Established in 1912

BALLOFFET VIANNEY WIRE DIE CO., Inc.

All sizes from .104" down to .0004" in stock

Manufacturers of Quality diamond dies since 1870

BALLOFFET VIANNEY WIRE DIE CO., Inc.
6825 ADAMS ST. GUTTENBERG N. J.
Tel. Union 3-3393

WANT GOOD WIRE? THEN USE "THE BEST" DIES!

Only top-quality DIAMONDS are used by WAYNE. This, plus perfection in workmanship, is responsible for the fine reputation of WAYNE WIRE DRAWING DIES

Satisfactory DIAMOND DIES can only be made by those who have experience, skill and knowledge. WAYNE has all of these. Users have called WAYNE DIES "the best."

WAYNE WIRE DIE CO.

2 Maple Avenue, Linden, N. J.
Telephone: WAbash 5-2456

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL AJAX SUPPLIES INC.
R.R. 4, P.O. Box 66, Fort Wayne, Ind.

NEW ENGLAND WIRE DIE CO.
7 Forsberg St., Worcester, Mass.
EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.

DIAMOND WIRE DRAWING DIES
and DIAMOND POWDER
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St., Fort Wayne, Indiana
Phone: Harrison 4373

DIAMOND DIES
mounted unmounted
For Precision Wire Drawing
BRENON, INC.
Experts in Fine Size Diamond Dies
R.F.D. #2, Box 400, Nixon, N. J.

"Natdi"
REVERSIBLE DIAMOND DIES
NATIONAL
WIRE DIE CO. INC.
12 WEST 21st St. N.Y. 10, N.Y.

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

DIAMOND POWDER
Diamond Reclaiming Services
FORT WAYNE DIAMOND PRODUCTS, INC.
2623 E. Pontiac Fort Wayne 5, Indiana

FINE WIRE
ENAMELING OVENS
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

DIAMOND DIES
PROFILED DIES
FINE SIZE DIES
VICTOR J. BOULIN INC.
10 FIRST STREET, PELHAM, N. Y.

employing 770 people in its two plants in Fort Wayne and La Fayette.

* * *

No major changes in personnel or policies are anticipated. The company, however, is expected to make greater use of aluminum to capitalize on the significant advances in aluminum for magnet wire applications.

New Wire Mill in Peru

A company, the Sociedad Quimico Industrial Ltda., has been incorporated to draw wire and manufacture welding rods therefrom in a new plant located at Castilla Correo 1914, Lima, Peru.

* * *

The plant was supplied by the **Champion Rivet Company** of Cleveland, Ohio, who also have extended a license to the firm to manufacture. **Panox S. A.,** a subsidiary of **The Southern Oxygen Company,** is associated with the venture.

* * *

Individuals who developed the project are **David Champion,** Champion Rivet Co.; **J. J. Morrissey,** Southern Oxygen Co.; and Eduardo Dibos Ch., a mechanical engineer who graduated from M. I. T. in 1947 and who has been active in his profession since then in his country.

* * *

The new firm plans to serve the South American market with its manufacturing facilities.

Electronic Rubber Changes Name

The Electronic Rubber Company, 69 Sunnyside Ave., Stamford, Conn., officially changed its cognomen as of January 1st to **Electronic Rubber & Plastics Corporation,** according to an announcement made by **Harry J. Linse,** President.

* * *

The company blends and processes insulating materials for the electric wire and cable industry to furnish customers with compounds having special insulating properties. Since a large portion of its business is the supplying of plastic compounds, the name change is

DIAMOND DIES
.0002 to .128
For many years . . .
Outstanding in quality,
workmanship and service.
FORT WAYNE WIRE DIE, INC.
2625 E. Pontiac St., Fort Wayne, Ind.

DIAMOND WIRE DRAWING DIES
DIAMOND POWDER AND
COMPOUNDS
DIE RECUTTING SERVICE
CARBIDE DIES • TOOLS • PARTS
RUSCH WIRE DIE CORPORATION
CROTON-ON-HUDSON, N. Y.

CARBIDE NAIL TOOLING
For
Domestic and Foreign Machines
available from STOCK
PITTSBURGH CARBIDE DIE CO.
Monongahela, Penna. BLackburn 8-6959

TUNGSTEN CARBIDE WIRE
DRAWING & COLD HEADING
DIES and CARBIDE TOOLING
EASTERN CARBIDE CORP.
NEW ROCHELLE, N. Y.

Drawing Angle-Controlled
DIAMOND DIES
HOOSIER WIRE DIE, INC.
3233 S. Lafayette St., Ft. Wayne, Ind.

WIRE DRAWING MACHINERY
AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames —
Take-Up Frame, Wire — Pointers — Pulley
Tongs — General and heat resisting alloy
castings for wire mill use.
Circulars on Request
E. J. Scudder Foundry & Machine Co.
TRENTON, N. J.

METALLIZING WIRE
PURE ZINC and CADMIUM
Other Fine Bare Wires
Manufactured to Your Specifications
IMMEDIATE DELIVERY
STAMFORD PROCESSING CO.
10-24 S. Water St., Peekskill, N. Y.

TOTELINE
FIBERGLASS
REELS
MOLDED FIBER GLASS TRAY CO.
LINESVILLE, PA.

FOR HIGH PRODUCTION OF
WIRE FORMS & METAL STAMPINGS
. . . CHOOSE FROM 17 MODELS OF
NILSON 4-SLIDE MACHINES
A. H. NILSON MACHINE COMPANY
625 Bridgeport Avenue, Shelton, Conn.

for finest quality products
start with
WEBB WIRE
Stainless • Needle • Nickel Alloy
WEBB WIRE
DIVISION OF THE CARPENTER STEEL CO.
NEW BRUNSWICK, N. J.

Wire Measuring...
PRODUCTIMETERS
Send for Catalog No. 40
Precision-built for accuracy and speed. Most complete line offered
DURANT MANUFACTURING CO.
1918 N. Buffum Street, Milwaukee 1, Wisconsin • 18 Thurbers Ave., Providence 5, R.I.

WOOD REELS and SPOOLS
1" to 60" Diameters
American Wood Working Company
MONTELLO, WISCONSIN

Zinc Metallizing Wire
THE PLATT BROS. & CO.
Waterbury 20, CONN.

WORLD'S LARGEST MANUFACTURER
SPIRAL WRAPPING MACHINES
For Coils or Straight Lengths
Terkelsen Machine Company
323 A Street, Boston 10

FINE and MEDIUM SIZE WIRE
TAKE-UPS
8, 10, & 12 SPINDLES
COLBOURNE MACHINE COMPANY
21 MUNRO ST. • WINSTED, CONN.

SAXL
TENSION METERS
Quick Trigger Action*
For Wire Drawing, Insulating, Enameling and Coil Winding
American made and serviced, always reliable
TENSITRON, INC., Harvard, Mass. *Patented

EMORY
SPOOLERS AND TRAVERSES
ROBERT J. EMORY CO.
31 E. RUNYON ST., NEWARK 5, N. J.

more accurately descriptive of the company's work.

Tyson Bearing to Expand

A two-million dollar expansion project starting in January at the **Tyson Bearing Company**, Massillon, Ohio — a division of SKF Industries, Inc. — will substantially add to the plant's tapered roller bearing capacity, according to an announcement by **E. R. Broden**, SKF President.

* * *

Completion of the project in July, 1960, involving additions to both plant structure and equipment, will enable Tyson to almost triple current production in sizes ranging from four and one-half to six inches outside diameter. This size range is used in heavy farm equipment, large earth-moving vehicles, buses, tractor-trailer trucks, and medium industrial machinery.

Beryllium Corp. Elects Executive Vice President

The election of **Lawrence F. Boland** as executive vice president of the **Beryllium Corporation** by the company's board of directors was announced here by **Walter R. Lowry**, president.

* * *

Mr. Boland was previously vice president and is a director of the parent company as well as a director of **Nonotuck Manufacturing Company**, Holyoke, Mass., a wholly owned Beryllium subsidiary and of Consolidated Beryllium, Ltd., of Avonmouth, England, a firm partly owned by the Beryllium Corporation. Mr. Boland joined the company when it moved to Reading in 1936.

* * *

Mr. Boland will coordinate operations and continuing expansion of all divisions of the company. This includes plans to enlarge research activities centered at Reading and substantially enlarge the Hazelton, (Pa.) nuclear facilities.

* * *

The company is also building a new plant for Nonotuck Manufacturing Company at Hadley, Mass. to be occupied in late 1960.

REELS
Wood, Plywood, Hardboard
8" to 72" in diameter
Durkee Manufacturing Co. Inc.
Pine River, Minnesota

Attire Marking Allbut Engraving
GENUINE ENGRAVED
HAND TOOLED
FLAT AND CONCAVE
MARKING WHEELS
FOR PLASTIC & RUBBER INSULATON
FRANK DANIELS & CO.
154 NASSAU ST. • NEW YORK 38, N. Y. • BEekman 3-9284

NEW—LINE—GORCY
mechanical
wire rod descalers
FISHER ASSOCIATES
122 East 42nd St. New York 17, N. Y.

CARRIS REELS, INC.
Specialists in the design and manufacture of Plywood Reels and Hardboard Spools.
Rutland, Vermont

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
for the Wire and Wire Products Industry

NEP · SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE PARKIN CHEMICAL CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

WOOD REELS
FOR
CABLE · ROPE · WIRE
QUICK DELIVERIES ON
ASSEMBLED OR
KNOCKED DOWN REELS
SHIPPED FROM BALTIMORE, MD.
HARTSELLE, ALA. (BAKER MFG. CO.)
The NELSON Company
STANDARD OIL BLDG. BALTIMORE 2, MD.

Immediately Available
WIRE WORKING MACHINERY

FOURSLIDES: Baird, Nilson & Manville, Nos. 0, 1, 2, 3, 4, 5, 3-20, 4-26
U. S. Tool Co. No. 22, 28, & 33 Multislides
Sleeper & Hartley Spring Coilers Nos. 0, 1, 2, 3, 3½, 4, & 5 & Torrington W10 & W12
Vaughn No. 8, 10, & 12 Moto-Blocs
Waterbury No. 3 Bull Blocks, Duplex
Morgan 4 stand Wire Drawer with pointer and 100 H.P. motor drive & motor
Waterbury Nos. 1, 2, & 3 Continuous Wire Drawing Machines

PARTIAL STOCK LISTING
"The most diversified stock of machinery in the country. If it's machinery we have it."

National Machinery Exchange
130 Mott St., New York 13, N. Y.
CAnal 6-2470

FINE WIRE RESPOOLING MACHINES
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

FOR SALE — WIRE WORKING MACHINERY
1 - Oswego Rod Machine 5/16" to 14 ga.
3 - Oswego Step Cone, 13 Die Drawing Machines
12 - Wardwell Fine Wire Braiders
For Machinery to BUY or SELL — Call Us
PUT US ON YOUR MAILING LIST
JOHNSON MACHINERY COMPANY
683 Frelinghuysen Avenue, Newark, N. J.
Tel. BIgelow 8-2500

DEPENDABLE WIRE EQUIPMENT
FINE WIRE DRAWING MACHINES
RESPOOLING MACHINES
WIRE PLATING EQUIPMENT
SCREW TYPE TRAVERSES
HODGE BROS. MACHINE SHOP
2 HAVELL ST. • OSSINING, N. Y.

Steel & Wire machinery co.
15457 EUCLID AVE. CLEVELAND 12, OHIO
EXCLUSIVE DISTRIBUTOR FOR FARMER NORTON WIRE DRAWING MACHINES

HI-SPEED TAPING MACHINES
MULTI-TINNING TAKE-UPS
FINISH LINE TAKE-UPS
The finest that can be produced.
COLLINS BROS. MACHINE CO.
(Est. 1866)
WIRE & CABLE MACHY. DIV.
647 Roosevelt Ave., Pawtucket, R. I.

FOR SALE

Copper Hot rolling mill, complete from bar furnace to coilers and pickle tanks.

Reply to Box 1007
WIRE & WIRE PRODUCTS
453 Main St. Stamford, Conn.

Ajax Electric to Distribute Barkling Furnaces

Through an arrangement effective February 22, 1960, and announced by **Leon B. Rosseau,** president of the **Ajax Electric Company,** Philadelphia, Pa., Ajax will handle sales and service throughout the United States on the gas-fired furnaces produced for over 38 years by the Barkling Fuel Engineering Co., of Chicago. In the past, Barkling distribution has been confined largely to a few Mid-western states.

* * *

Thus, in addition to the well-known Ajax salt bath furnaces developed over a third of a century of pioneering leadership in this field, Ajax Electric Company will now offer a complete line of Ajax Barkling gas-fired heat treating and melting furnaces.

* * *

The complete line is described in the new Ajax-Barkling Catalog 106A available on request to the Ajax Electric Company, Frankford & Delaware Aves., Philadelphia 23, Pa.

British Licensees Appointed By Loma-Lobeck

Loma Machine Manufacturing Company, Inc., and its subsidiary, **Lobeck Casting Processes Inc.,** of New York City, have announced the conclusion of a licensing agreement with the **Albert Mann Engineering Company,** Basildon, Essex, England.

* * *

The agreement extends to the British Commonwealth, exclusive of Canada, and the countries of the European Free Trade Association. It facilitates the supply of Loma-Lobeck metal processing equipment of British construction, improving deliveries and costs to the firms' customers situated in these territories.

* * *

Under the terms of the agreement, the Mann concern can now supply billet and slab casting equipment, circular sawing machines, continuous rod and tube drawing machines, straightening and cut-off lines, stretcher levellers, air and hydraulic tube testers, and related mechanical handling equipment.

Executive — Electrical Wire & Cable Industry — age mid forties. Engineering background, college graduate. Over 20 years Responsible experience in Engineering and manufacturing in this industry. Excellent references. Reply to Box 1017.
WIRE AND WIRE PRODUCTS
453 Main Street Stamford, Conn.

WANTED — USED LEWIS!
WIRE STRAIGHTENING AND CUTTING MACHINES.
Send full details to
BOX 1019
WIRE & WIRE PRODUCTS

WANTED
MAN TO HANDLE PRODUCTION AND METALLURGICAL PROBLEMS IN SPECIALTY MILL.
THIS MILL DRAWS AND FABRICATES FERROUS AND NON FERROUS ALLOYS.
Reply to Box No. 1020
WIRE & WIRE PRODUCTS
453 Main St. Stamford, Conn.

WANTED — USED SHUSTERS!
Models A, 1-A, and 2-A Automatic Wire Straightening and Cutting Machines.
Send full details to
BOX 1008
WIRE & WIRE PRODUCTS

POSITION DESIRED
Practical Engineer — 46. Production- Maintenance-Design Experience as follows:
Wire drawing including ultra-fine Magnet Wire including Teflon — Silver Plating including Aluminum — Tin Plating and Hot Dip — Stranding and Bunching — Sales Engineering.
Will relocate
Reply to Box 1018
WIRE & WIRE PRODUCTS

BARBED WIRE
WIRE RODS
AND ALL OTHER WIRE PRODUCTS AND NAILS IMPORTED FROM OVERSEAS MILLS. PL. SUBMIT INQUIRIES TO:
ASSOC. METALS & MIN. CORP.
75 WEST STREET NEW YORK

Index to Advertisers

A

Acoustica Associates, Inc. 359
Acrometal Products, Inc. 326
Addison Division, Muirhead Instruments, Inc 364
Advanced Wyrepak Co., Inc. 352
Ajax Electric Company 374
Ajax Industrial Supplies, Inc. 394
American Chain & Cable Company, Inc.
Page Steel and Wire Division 271
American Insulating Machinery Company 369
American Lava Corporation 288
American Laubscher Corporation—Niehoff Machine Works 287
American Pulley Company, The, Hubbard Spool Division 318
American Wood Working Company 395
Apco Mossberg Company 361
Associated American Winding Machinery, Inc. 391

B

Balloffet-Vianney Wire Die Co., Inc. 393
Bartell Machine-Tool Corp. 368
Blane Corporation, The 270
Boltmaster Co., The 362
Boulin, Victor J., Inc. 394
Brenon, Inc. 394
Bridge Manufacturing Company 281

C

Camden Wire Co., Inc. 384
Carl Mayer Corp., The 382
Carpenter Steel Company, The Webb Wire Div. 395
Carris Reels, Inc. 395
Cary Chemicals Inc. 310
Central Tool and Machine Co., Wire Tool Division 384
Chadwick Yarn Company 392
Cleveland Tramrail Division
The Cleveland Crane & Engineering Co. 395
Colbourne Machine Co. ..... 394, 395, and 396
Collins Bros. Machine Co. 396
Colorado Fuel & Iron Corporation, The ..... 294 and 295
Continental Steel Corporation 360
Cook Manufacturing Co. 284
Coulter & McKenzie Machine Co., Inc., The Inside Front Cover

D

Danforth, C. W., Co. 393
Daniels & Co., Frank 395
Davis Electric Co. 370
Detroit Steel Corporation 328
Durant Manufacturing Co. 395
Durkee Manufacturing Co., Inc. 395
Dykrex Corporation of America 388

E

Eastern Carbide Corp. 394
Edmands Company, The 382
Elgin National Watch Company, Abrasives Division 334
Emory, Robert J. Company 395
Enjaco Corporation 390
Entwistle Manufacturing Corporation 282

F

Federal Manufacturing Co., The 379
Fenn Manufacturing Company, The 306
Fisher Associates 395
Fort Wayne Diamond Products, Inc. 394
Fort Wayne Wire Die, Inc. 394

G

Gem Gravure Co. 393
General Engineering Co., (Radcliffe) Ltd. 286
General Tire & Rubber Company, The, Chemical Division 308
Gillies, Duncan M., Co., Inc. 358
Glader, Wm., Machine Works 366

H

Hanson & Edwards, Ltd. 367
Haskell-Dawes Machine Co., Inc. 383
Heany Industrial Ceramic Corp. 387
Herborn Maschinenfabrik 315
Hodge Bros. Machine Shop 396
Hoosier Wire Die, Inc. 394
Hubbard Spool Division, The American Pulley Company 318

I

Indiana Wire Die Company 394

J

Jarke Manufacturing Company 385
Johnson Machinery Company 396
Jones & Laughlin Steel Corporation
Stainless and Strip Division ..... 336 and 337

K

Kelly Wire Die Corporation 394
Keystone Steel & Wire Company 285
Krupp, Fried, Maschinen-und Stahlbau Rheinhausen 356

L

Larmuth & Bulmer, Limited 349
Larmuth (1947), Ltd. 383
Lewis Machine Company, The 293
Ludlow Papers 385

M

Magnuson Products Corporation 391
Malin & Company, The 390
Marathon Specialty Steels, Incorporated 314
Metal Carbides Corporation 304
Mettler Machine Tool Inc. 296
MH Machines, Morgardshammars Mek Verstads, AB 316 and 317
Micro Products Co. 298
Miller, R. H. Company, Inc. 320
Molded Fiber Glass Tray Co. 394
Monsanto Chemical Company, Plastics Division 339
Montgomery Company, The 391
Morgan Construction Co. 272
Mossberg Pressed Steel Corporation,
Division of Wanskuck Co. 378
Muirhead Instruments Inc., Addison Division 364

N

National Machinery Co. ..... 312 and 313
National Machinery Exchange 396
National Standard Electronics, Inc. 275
National Wire Die Co., Inc. 394
Naugatuck Chemical Division, United States Rubber 279
Nelson Company, The 395
New England Butt Co.
Division Wanskuck Company 274
New England Wire Die Co. 394
New York Engineering Company 365
Niederrheinsche Huette, A. G.
Kurt Orban Company, Inc. 381
Nilson, The A. H. Machine Co. 395
Nippon Stainless Steel Wire Mfg. Co., Ltd. 392
Norton Company 377
Norton & Co., Ltd., Sir James Farmer ..... 276 and 277

O

Ofenbau, Fritz, G.m.b.H. & Co., K.G. 380
Orban Kurt, Company, Inc., Niederrheinische Huette A.G. 381

P

Page Steel and Wire Division
American Chain & Cable Company, Inc. 271
Parker Rust Proof Company ..... 300 and 301
Parkin Chemical Co., The 395
Penn Machinery Company 375
Pittsburgh Carbide Die Co. 394
Platt Bros. & Co., The 395

R

Republic Steel Corporation, Berger Division 388
Rivom 386
Robinson Co., Inc., M. W. 273
Roebling's, John A. Sons Corporation, Subsidiary of
The Colorado Fuel & Iron Corporation 303
Roux Wire Die Works, Inc. 387
Royle, John & Sons 299
Rusch Wire Die Corporation 394

S

Scovill Manufacturing Company, Mill Products Division 278
Scudder Foundry & Machine Co., E. J. 394
Showa Machine Works Ltd. 309
Sjogren Tool & Machine Co., Inc. 381
Sleeper and Hartley, Inc. 305
Stamford Processing Co. 394
Standard Industrial Compounds Co., Inc. 269
Standard Mill Supply Company 390
Steel & Wire Machinery Co. 396
Steel Equipment Company 289
Straus-Artys Corp. 371
Sunbeam Equipment Corporation 280
Superior Tool & Manufacturing Co. 390
Syncro Machine Company ..... Back Cover
Synthetic Thread Co. 391

T

Tensitron, Inc. 395
Terkelsen Machine Company 395
Thermoplastic Equipment Division of
Thermoplastic Processes Inc. 283
Twitchell, Inc., E. W. 363

U

Union Carbide Plastics Company, Division of
Union Carbide Corporation ..... 290 and 291
United States Borax & Chemical Corporation 389
United States Rubber, Naugatuck Chemical Division 279
Universal Industrial Equipment Co. 380
U. S. Industrial Chemicals Co., Division of
National Distillers and Chemical Corp. 297

V

Vaughn Machinery Company, The ..... Front Cover

W

Wafios Maschinenfabrik 302
Watson Machine Company, The ..... Inside Back Cover
Wayne Wire Die Co. 393
Webb Wire Division, The Carpenter Steel Company 395
Wells, Frank L. Company 376
Weston Instruments Division of
Daystrom, Inc. 292
Western Wire & Textile Machinery, Inc. 386
Wheelabrator Corp. ..... 372 and 373
Whitacre Engineering & Manufacturing Company 307
Wilson, Lee, Engineering Company, Inc. 311
Wire & Textile Machinery Inc. 392
Wire Machinery Inc. 354

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Buyers' Guide. Advertisers who have contracted for 6 or more insertions are entitled to up to 8 listings in this section.

ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Associated American Winding Machinery, Inc., New York, N. Y.
Molded Fiber Glass Tray Co., Linesville, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

BORAX—Wire Drawing
United States Borax & Chemical Corp., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Ludlow Papers, Needham Heights, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

CAPSTANS—for Wire (also Caterpiller Types)
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Larmuth & Bulmer Limited, Manchester, England

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
Apex Alkali Products Co., Phila., Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Homer, N. Y.
Parker Rust Proof Co., Detroit, Michigan
Standard Industrial Compounds Co., Frankfort, Ill.
United States Borax & Chemical Corp., New York, N. Y.

COLOR CONCENTRATES—For Wire Coatings
Blane Corporation, The, Canton, Mass.

COMPOUNDS—Coppering
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion, for Wire
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.

COMPOUNDS—Metal Finishing
Apex Alkali Products Co., Philadelphia, Pa.
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Phosphate Coating
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Rust Preventing
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Escambia Chemical Corporation, New York, N. Y.
Parker Rust Proof Co., Detroit, Michigan

COMPOUNDS—Rust Removing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
General Tire & Rubber Company, The, Akron, Ohio
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, New York, N. Y.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
United States Borax & Chemical Corp., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockville, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDERS—
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDER RECLAIMING—
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Wayne Wire Die Co., Linden, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES DIAMOND—Reversible
Indiana Wire Die Company, Fort Wayne, Indiana
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Central Tool and Machine Co., Bridgeport, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France.
Rusch Wire Die Co., Croton-on-Hudson, N.Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Roll Threading
Rivom, Dijon, France

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Rivom, Dijon, France

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tinning
American Lava Corporation, Chattanooga, Tenn.
Roux Wire Die Works, Inc., Oriskany, N. Y.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rivom, Dijon, France
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY)—Draw Benches)

DRIVES—Variable Speed
Allis Co., Louis, Milwaukee, Wisc.

DRUMS—Wire Packaging
Hubbard Spool Company, Div., The American Pulley Co., Garrett, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A. Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Galvanizing Equipment
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen (W. Germany)
Sunbeam Equipment Corporation, Meadville, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Sunbeam Equipment Corporation, Meadville, Pa.
Wilson Lee Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Resistance Heating, Strand
Sunbeam Equipment Corporation, Meadville, Pa.

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co. K. G., Hagen, (W. Germany)
Sunbeam Equipment Corporation, Meadville, Pa.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
American Lava Corporation, Chattanooga, Tenn.
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS—
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
General Tire & Rubber Company, The, Akron, Ohio
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, Naugatuck, Conn.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINE CONTROLS—Electronic
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Blast Cleaning
Wheelabrator Corporation, Mishawaka, Ind.

MACHINERY—Bobbin Winders
Associated American Winding Machinery, Inc., New York, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Larmuth and Bulmer, Limited, Manchester, England

MACHINERY—Bolt, Rivet, Screw, etc.
Boltmaster Co., The, Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Prutton Corporation, Cleveland, Ohio.
Straus-Artys Corp., Great Neck, N. Y.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Braiding
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, Ohio

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Link Fence
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio

MACHINERY—Chain Making
Larmuth and Bulmer, Limited, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Closing Cable
Larmuth and Bulmer, Limited, Manchester, England
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N.J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Cold Heading
Boltmaster Co., The, Cleveland, Ohio
National Machinery Co., Tiffin, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Johnson Machinery Co., Newark, N. J.
Morgardshammars Mek Verkstads A. B., Morgardshammar, Sweden
National Mach'y Exch (Used), New York
Showa Machine Works, Ltd., Osaka, Japan
Steel & Wire Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Maschinenfabrik, Herborn, Germany
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Diameter Control
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Sjogren Tool & Machine Co., Auburn, Mass.
Wayne Wire Die Co., Linden, N. J.

MACHINERY—Draw Benches
American Laubscher Corporation, New York, N. Y.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Eccentricity Control (Insulated Wire)
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Edging (See MACHINERY—Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Johnson Machinery Co., Newark, N. J.
Royle, John, & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Wafios Machinery Corp., Hackensask, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Company, Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Steel Equipment Company, Cleveland, Ohio
Steel & Wire Machinery Co., Cleveland, Ohio
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
National Mach'y Exch. (Used), New York, N. Y.
Nilson Machine Co., A. H., Shelton, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel & Wire Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Footage Meters
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Galvanizing Wire
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Steel & Wire Machinery Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Impregnation Control, Paper Cables
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulation Testing (See MACHINERY—Spark Testing)

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia, Pa.
Cook Mfg. Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
EVG., Machinen & Stahl, A. G., Zurich, Switzerland

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Diam., Insulated Wire
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wisc.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Larmuth and Bulmer, Limited, Manchester, England
National Standard Electronics, Inc., New York, N. Y.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Measuring and Control—Coating
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Measuring Width-Flat Wire
National Standard Electronics, Inc., New York, N. Y.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Co., Tiffin, Ohio
National Mach'y Exch. (Used), N.Y., N.Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Packaging Wire
Advanced Wyrepak Co., Inc., Bridgeport, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Patenting Wire
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Pin Making
Nilson Machine Co., A. H., Shelton, Conn.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Plating
Bartell Machine Tool Corp., Rome, N. Y.
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Printing on Electric Wire
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

MACHINERY—Re-Spooling
Associated American Winding Machinery, Inc., New York, N. Y.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
National Mach'y Exch. (Used), New York, N. Y.
Vaughn Machinery Co., Cuyahoga Fall, Ohio
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Company, Newington, Conn.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So San Francisco, Calif.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Mills
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios Machinery Corp., Hackensack, N. J.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Staple Making
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Straightening & Cutting
American Laubscher Corporation, New York, N. Y.
Johnson Machinery Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson, George C. Machine Co., Cleveland Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Steel & Wire Machinery Co., Cleveland, Ohio
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Bartell Machine Tool Corp., Rome, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Johnson Machinery Co., Newark, N. J.
Krupp, Fried., Machinen-Und Stahlbau Rheinhausen, Germany
Larmuth & Bulmer Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Company, Newington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.

MACHINERY—Tandem Rolling & Edging Mills
Fenn Manufacturing Company, Newington, Conn.

MACHINERY—Take-Up and Pay-Out
Advanced Wyrepak Co., Inc., Bridgeport, Conn.
American Insulating Mach'y Co., Phila., Pa.
Associated American Winding Machinery, Inc., New York, N. Y.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering Company (Radcliffe) Limited, Radcliffe, England
Johnson Machinery Co., Newark, N. J.
Larmuth & Bulmer Limited, Manchester, England
Litzler, C. A., Co., Inc., Cleveland, Ohio
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Thread Rolling
Boltmaster Co., Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Prutton Corporation, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.

Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
Cook Manufacturing Co., The, Paterson, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.
Whitacre Engineering & Manufacturing Company, Alhambra, California

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyanoga Falls, Ohio

MACHINERY—Tube Mill, Cold Drawing
Johnson Machinery Co., Newark, N. J.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Collins Bros. Machine Co., Wire & Cable Mach'y Div., Pawtucket, R. I.
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
Johnson Machinery Co., Newark, N. J.
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Welded Wire Mesh
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Schlatter, Ltd., H. A., Zollikon/Zurich

MACHINERY—Variable Speed Drives
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery—Welding Wire Fabrics)

MACHINERY—Winding Wire
Associated American Winding Machinery, Inc., New York, N. Y.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York, N. Y.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Company, Newington, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Johnson Machinery Co., Newark, N. J.
Loma Machine Manufacturing Co., Inc., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammars Mek Verkstads AB, Morgardshammar, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Showa Machine Works Ltd., Osaka, Japan
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Wire and Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Superior Tool & Machinery Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdry. & Mach. Co., Division of Textron Inc., Waterbury, Conn.
Whitacre Engineering & Manufacturing Company, Alhambra, California
Wire Machinery Inc., Chicago, Ill.

MACHINERY—Wire Preheating
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.

MACHINERY—Wire Rope
Larmuth and Bulmer, Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
American Laubscher Corp., New York, N. Y.
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Company, Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio

MOTORS—Electric
Allis Co., Louis, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pan American Trade Development Corp. New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Central Tool and Machine Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAPER—Coil Wrapping
Ludlow Papers, Needham Heights, Mass.

PAPER—Insulating
Ludlow Papers, Needham Heights, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Cary Chemicals, Inc., New Brunswick, N. J.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS—for Wire Insulation
Blane Corporation, The, Canton, Mass.
Cary Chemicals, Inc., New Brunswick, N. J.
Escambia Chemical Corporation, New York, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, Tonowanda, N. Y.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, Naugatuck, Conn.

PRINTING WHEELS—for Electric Wire
Daniels & Co., Frank, New York, N. Y.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., Inc., West Hanover, Mass.
Gillies, Duncan M. Co., Inc., West Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PULLEYS—Ceramic
American Lava Corporation, Chattanooga, Tenn.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Mettler Machine Tool, Inc., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Berger Div., Canton, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New York Engineering Corp., Yonkers, N. Y.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
New York Engineering Corp., Yonkers, N. Y.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Molded Fiber Glass Tray Co., Linesville, Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Nelson Co., The, Baltimore, Md.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Wood Working Co., Montello, Wisc.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Nelson Co., The, Baltimore, Md.

REFRACTIONS—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Pan American Trade Development Corp. New York, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

ROPE—Wire
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons, Div. Colorado Fuel & Iron Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Removing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Associated American Winding Machinery, Inc, New York, N. Y.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Molded Fiber Glass Tray Co., Linesville, Pa.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Div. Colorado Fuel & Iron Corp., Trenton, N. J.

TANKS—Ceramic, for Galvanizing
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, W.-Germany)

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TENSION METERS—for Wire
Boulin Instrument Corporation, Pelham, N. Y.
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
Tensitron, Inc., Harvard, Mass.

TESTERS—INSULATION
(See Testing Equipment—for Dielectric Faults)

TESTING EQUIPMENT — Dielectric Faults in Insulation
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Muirhead Instruments, Inc., (Addison Electric), New York, N. Y.
Peschel Electronics, Inc., Patterson, N. Y.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

TESTING EQUIPMENT — Physical
Scott Testers, Inc., Providence, R. I.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

TRANSMISSIONS—Variable speed (See Adjustible Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Associated American Winding Machinery, Inc., New York, N. Y.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WAXES—for Insulated Wire
Cary Chemicals, Inc., New Brunswick, N. J.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Micro Products Co., Chicago, Ill.
Schlatter, Ltd., H. A., Zollikon-Zurich

WHEELS—for Printing on Electric Wire
Daniels & Co., Frank, New York, N. Y.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

WIRE—Aluminum
Malin & Co., The, Cleveland, Ohio
Scovill Mfg Co., Waterbury, Conn.

WIRE—Ball
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Malin & Co., The, Cleveland, Ohio
Scovill Mfg. Co., Waterbury, Conn.

WIRE—Bunched and Stranded
Camden Wire Company, Camden, N. Y.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Scovill Mfg. Co., Waterbury, Conn.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Copper
Camden Wire Company, Camden, N. Y.
Malin & Co., The, Cleveland, Ohio

WIRE—For Electrical Conductors
Camden Wire Company, Camden, N. Y.

WIRE—Flat
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Jones & Laughlin Steel Corp, Stainless and Strip Div., Detroit, Mich.
Montgomery Co., The, Windsor Locks, Conn.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pan American Trade Development Corp., New York, N. Y.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado, Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Detroit Steel Corporation, Detroit, Mich.
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Marathon Specialty Steels, Inc., New York, N. Y.
Republic Steel Corp., Berger Div., Canton, Ohio
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Metalizing
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Platt Bros & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Malin & Co., The, Cleveland, Ohio

WIRE—Needle
Marathon Specialty Steels, Inc., New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio

WIRE—Oil Tempered
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio
Pan American Trade Development Corp., New York, N. Y.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Marathon Specialty Steels, Inc., New York, N. Y.
Pan American Trade Development Corp., New York, N. Y.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Stainless Steel
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Malin & Co., The, Cleveland, Ohio
Nippon Stainless Steel Wire Mfg. Co., Ltd., Osaka, Japan
Pan American Trade Development Corp., New York, N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Malin & Co., The, Cleveland, Ohio
Pan American Trade Development Corp., New York, N. Y.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Upholstery and Mattress
Pan American Trade Development Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
National Standard Electronics, Inc., New York, N.Y.
Scott Testers, Inc., Providence, R. I.

YARNS—Wire Insulating
Chadwick Yarn Company, Pawtucket, R. I.
Synthetic Thread Co., Bethlehem, Pa.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

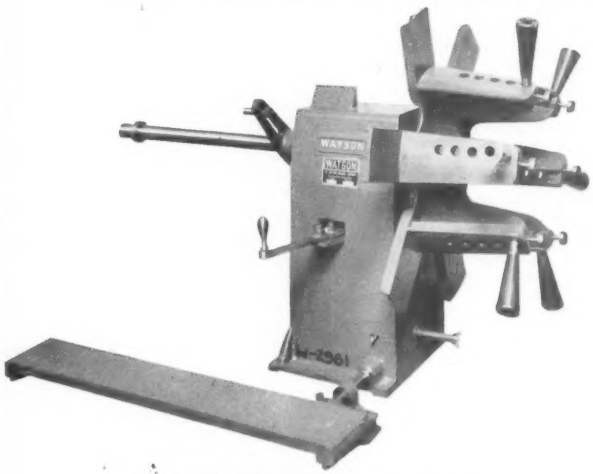
PATERSON 16, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

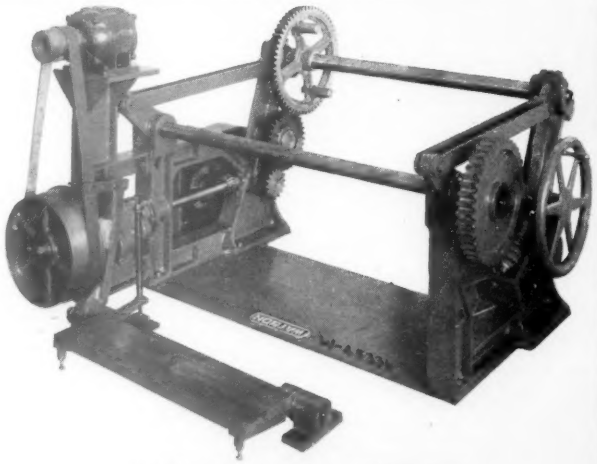
REWINDING, COILING AND OTHER EQUIPMENT

FOR WAREHOUSES AND SHIPPING ROOMS.



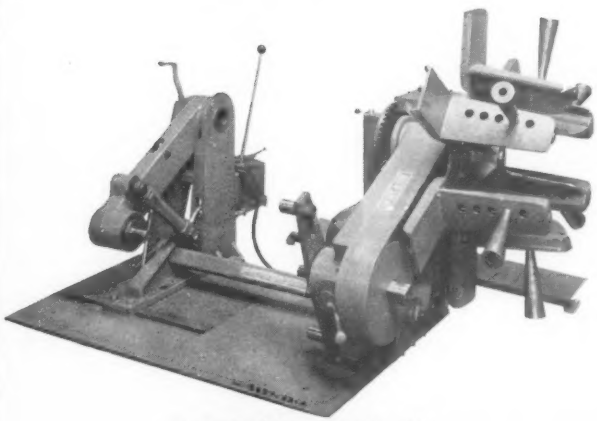
OVERHUNG SHAFT — TYPE "RC"

FOR REELS TO 54" DIA.
3-SPEED — MOTORIZED



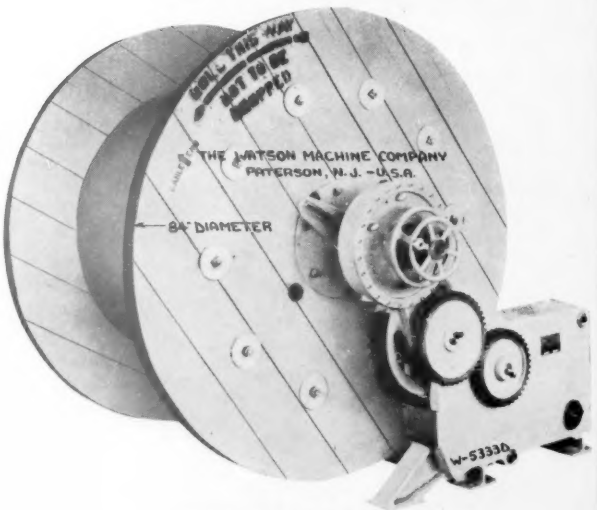
MECHANICAL LIFT — TYPE "W"

MANY SIZES FOR REELS TO 84" DIA.
5-SPEED — MOTORIZED



"SHAFTLESS" — TYPE "H"

FOR REELS TO 50" & 72" DIA. — 6-SPEED OR
INFINITELY VARIABLE MOTORIZED DRIVE.



"SHAFTLESS"— TYPE "R"

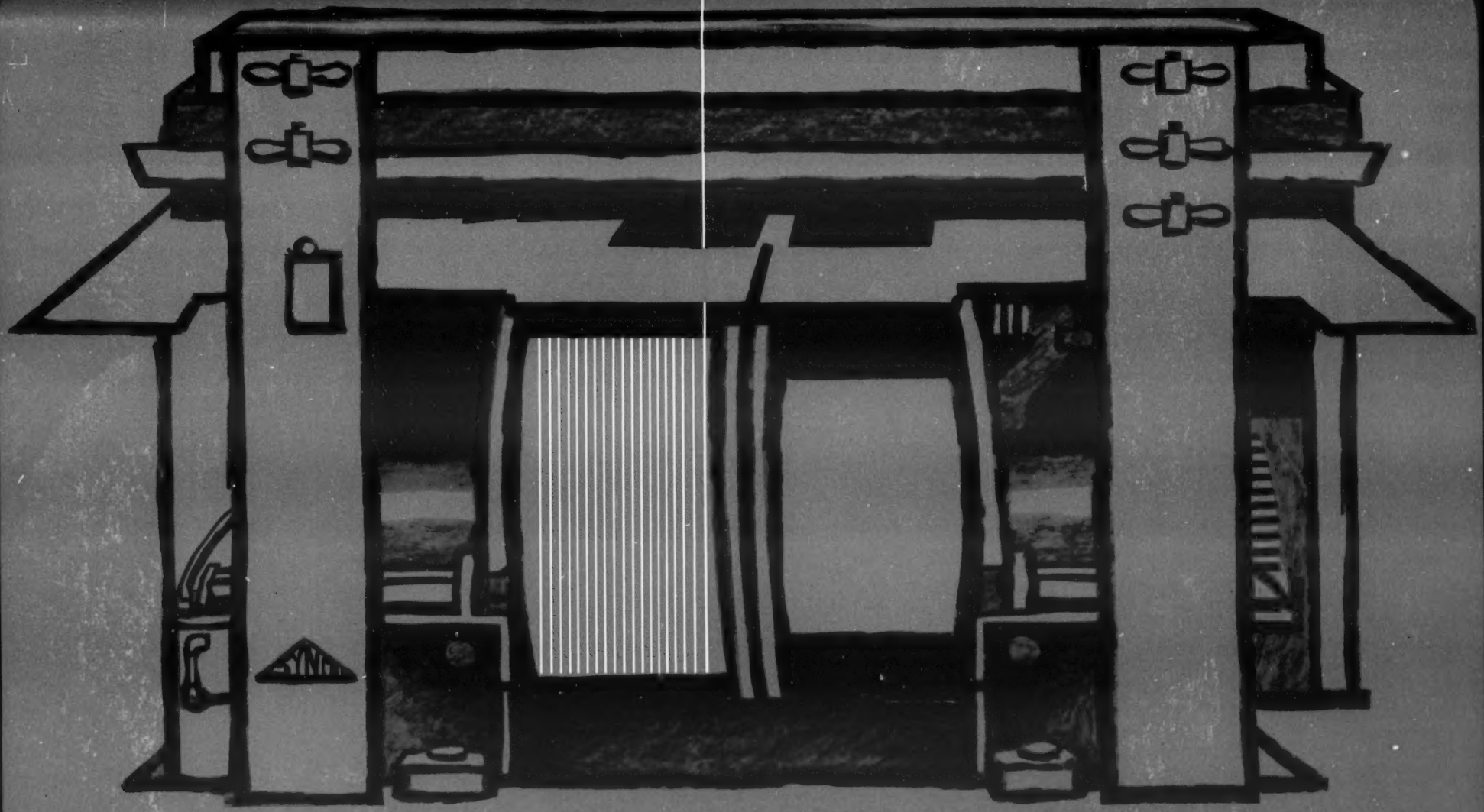
FOR REELS TO 60" & 84" DIA. — 5-SPEED OR
INFINITELY VARIABLE MOTORIZED DRIVE.

SPACE LIMITATIONS PREVENT ILLUSTRATIONS HERE OF OTHER AVAILABLE DESIGNS, INCLUDING OTHER REWINDERS & COILERS, EQUIPMENT FOR MOVING HEAVY REELS, MEASURING MACHINES, TESTING MACHINES, ETC.

FOR LITERATURE AND OTHER INFORMATION, ADVISE US OF APPLICATION, REEL SIZES AND WEIGHTS AND ELECTRIC CURRENT AVAILABLE.

3-60

...tter machinery for the wire industry"...



a phrase that becomes a fact with every installation of Syncro Machine Company equipment. Syncro's complete line of modern high-speed wire and cable mill machinery represents 30 years of industry leadership. Our familiar triangle is your assurance—Syncro will continue to meet today's requirements by anticipating tomorrow's demands.

Continureel*—an automatic high-speed takeup accommodating dual 30" flange reels.

Our engineers welcome the opportunity to give you further information on how Syncro can help meet your plant's wire and cable production requirements. Write Syncro Machine Company, Dept. C, Perth Amboy, New Jersey or phone Hillcrest 2-5500.

*TRADEMARK APPLIED FOR

SYNCRO®

WIRE DRAWING MACHINES • STRANDERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

affiliated company: Winget Syncro Ltd., Rochester, Kent, England.

better machinery for the wine industry ...